

Maintaining the value of gas reserves in a carbon neutral world **(Сохранение стоимости запасов газа в углеродно-нейтральном мире)**

Prof. Dr. Andrey A. Konoplyanik,
Adviser to Director General, "Gazprom export" LLC;
Co-chair Work Stream 2 "Internal Markets",
Russia-EU Gas Advisory Council;
Professor on International Oil & Gas Business,
Russian State Gubkin Oil and Gas University

Presentation at the WS4: "Climate and Decarbonization" of the XI International Scientific Conference "ENERGETIKA XXI: Economy, Policy, Ecology" - "The Need for Energy Dialogue in a Fast Changing Environment", 14 -16 November 2018, St. Petersburg, Russia

Maintaining the value of (Russian) gas reserves in a carbon neutral (EU) world

Prof. Dr. **Andrey A. Konoplyanik**,

Adviser to Director General, "Gazprom export" LLC;

Co-chair Work Stream 2 "Internal Markets",

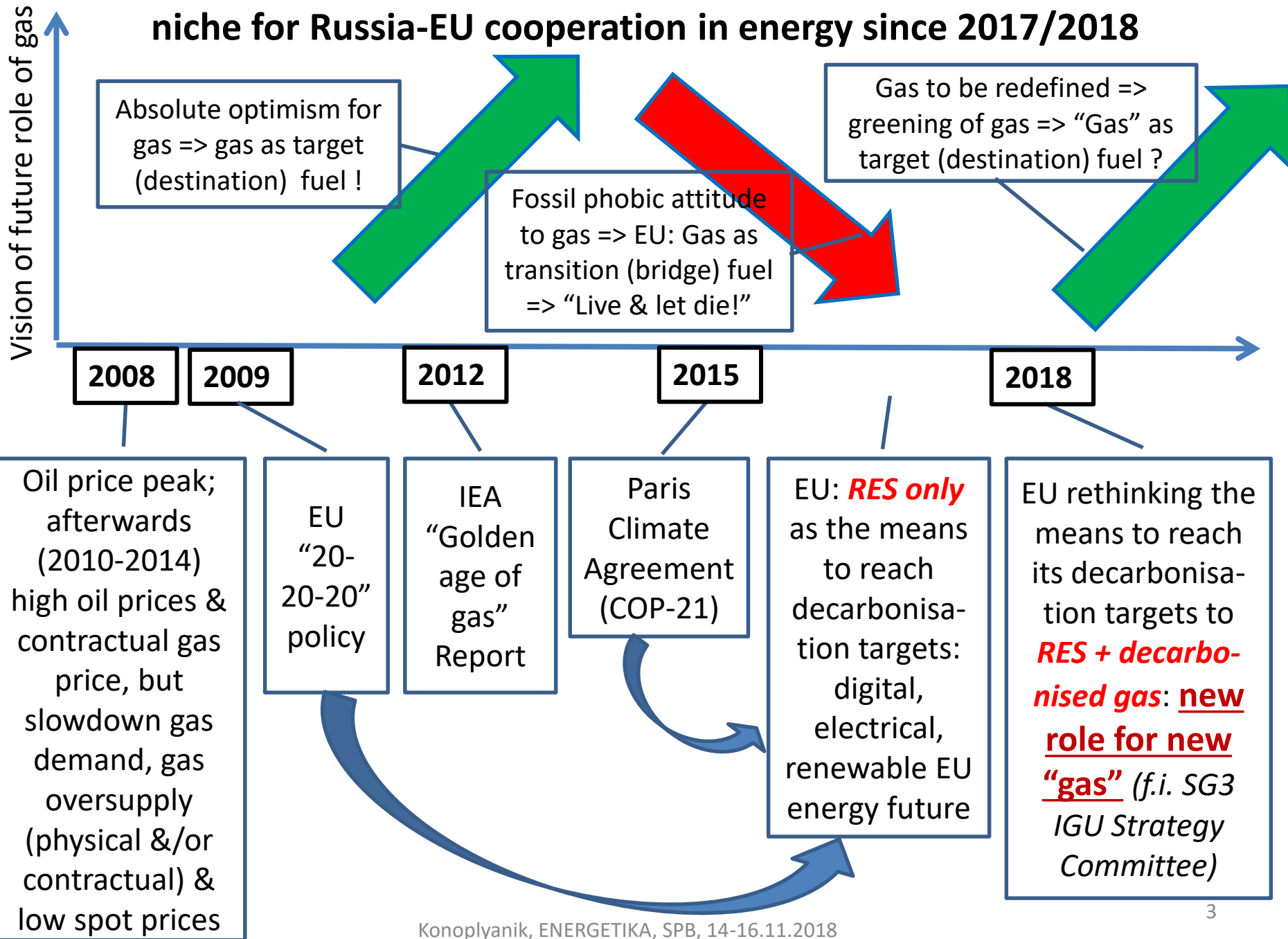
Russia-EU Gas Advisory Council;

Professor on International Oil & Gas Business,

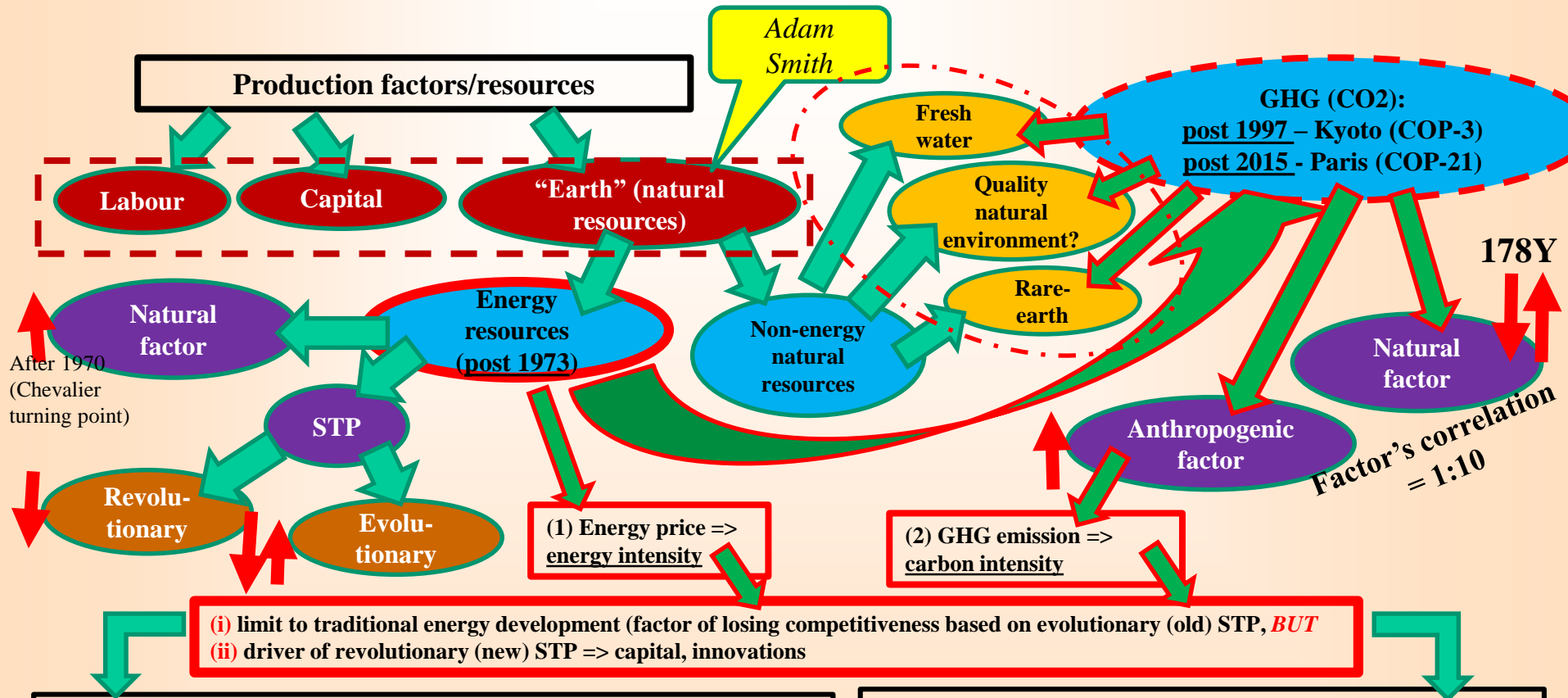
Russian State Gubkin Oil and Gas University

Presentation at the WS4: "Climate and Decarbonization" of the XI International Scientific Conference "ENERGETIKA XXI: Economy, Policy, Ecology" - "The Need for Energy Dialogue in a Fast Changing Environment", 14 -16 November 2018, St. Petersburg, Russia

EU: Changing upside-down vision of the future role of gas => new potential niche for Russia-EU cooperation in energy since 2017/2018



Political economy of world energy: production factors, inter-factors competition & STP in energy – & *current competitive niche of Russia*



Zones of competitive advantages of different states:

- **labour:** developing (price), developed (quality)
- **capital** (financial markets + innovations, technologies): developed (anglo-sax),
- **energy resources** (non-renewable/hydrocarbon): OPEC/KSA, USA, Russia => *current (beyond defense industries) zone of competitive advantages of Russia = mostly in non-technological areas (?) => Russia's dilemma: to switch from energy resource sphere or to stay within it but on the new competitive basis ? => how to monetize existing Russian energy – natural & technical - assets: natural (energy) resources & production infrastructure/facilities*

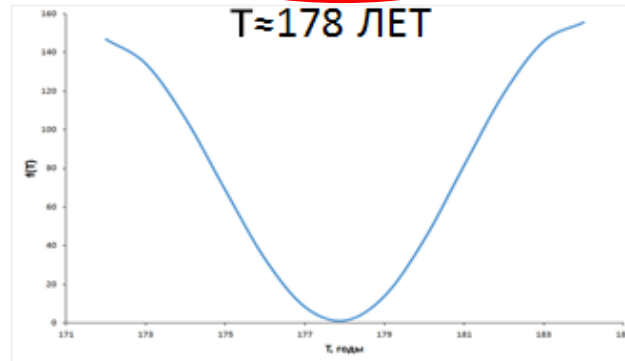
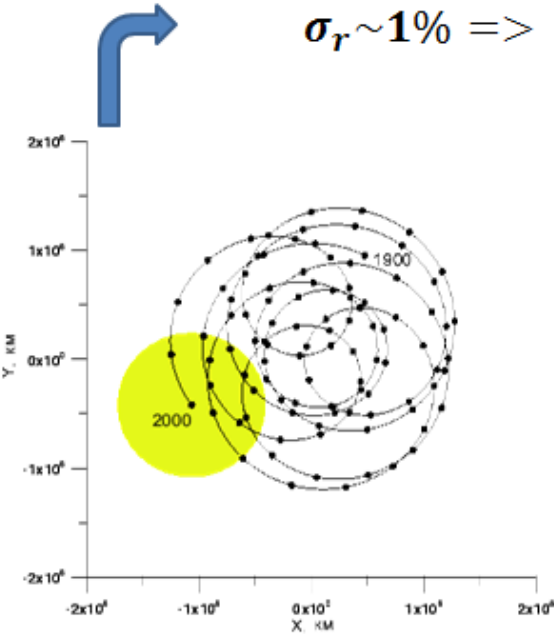
Options for increasing energy efficiency (diminishing energy cost component in GDP) = **substitution:**

1. By other energies => inter-/intra-fuel competition (STP)
2. (Direct) labour => export energy intensive industries to (developing) countries (cheap labour + lower ecological concerns)
3. Capital (past labour) => increase energy efficiency through all energy value chain (STP)
4. Non-energy materials (in non-energy use of energy resources) => (STP)

MCSS position relative to Sun determines 178 year-long climate cycle

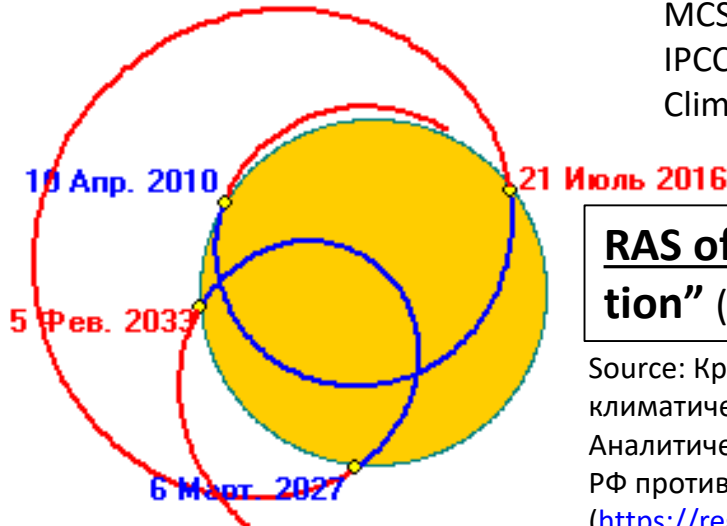
$$\sigma_r \sim 1\% \Rightarrow \sigma_I \sim 2\% \Rightarrow 27 \frac{B_T}{M^2} \gg 2.4 \frac{B_T}{M^2}$$

Earth fluctuates not around Solar but around MCSS. Incoming flow of solar radiation depends on Sun-Earth, not on MCSS-Earth distance. If these distances differ by Solar diameter, then flow of solar energy fluctuations long-term (± 24 W/sq.m) exceeds **by 10 times** increment of this flow (2.4 W/sq.m), which IPCC called as result of anthropogenic GHG increase.



$$f(T) = \sum_{i=6}^9 \frac{m_i r_i}{T_i} \sin^2 \pi \frac{T}{T_i}$$

MCSS = Mass Center of Solar System
 IPCC = Intergovernmental Panel on Climate Change



RAS official position: “Kyoto Protocol has no scientific justification” (RAS President Yu.Osipov to RF President V.Putin, 17.05.2004)

Source: Крученицкий Г.М. Презентация на Круглом столе «Риски реализации Парижского климатического соглашения для экономики и национальной безопасности России». Аналитический центр при Правительстве РФ, 18.07.2016; он же. Климатическая доктрина РФ против национальных интересов России. [IA REGNUM](http://ia-regnum.ru), 09.06.2016 (<https://regnum.ru/news/2143236.html>); Возможности предотвращения изменения климата и его негативных последствий. М. "Наука", 2006, с.258-259.

Two global challenges and possible similarity in reaction to them

Past challenge

(2nd half XX century):

Energy intensity of economy

- Oil switching (OPEC to non-OPEC oil) => **structural** effect
- Fuel switching (oil to nonoil energies => fossil & non-fossil fuels/RES) => **structural** effect
- Energy switching (1): energy to labour (substitution expensive energy by cheap labour => geographical transfer of energy intensive industries) => **structural** effect
- Energy switching (2): energy to capital (energy efficiency => **technological** (rev.STP) effect
- **New infrastructure** to be developed from the start of switching

Current/future challenge

(1st half XXI century):

Carbon intensity of economy

- Fuel switching (1) => other fossil fuels to gas (coal to gas in power & heat generation; oil to gas in motor fuels) => **structural** effect
- Fuel switching (2) => gas to MHM (as fuel at existing gas infrastructure & appliances) => **structural & technological** (Rev.STP) effect
- Fuel switching (3) => gas & MHM to hydrogen => **technological** (Rev.STP) effect:
 - From gas (+ monetizing natural gas resources)
 - From non-gas sources (RES electricity)
- **Existing gas infrastructure** can be used and later adapted

- Each measure (next step) additive to previous ones => accumulative effects;

- Sequence of measures: from easy-going & cheap to more costly & longer-term effects

How high in the list of national priorities climate agenda (and thus decarbonization) is placed due to objective preconditions

EU

- Accumulated negative ecological consequences since 1st industrial revolution (started much earlier => longer accumulation period)
- Smaller territory, higher population density => higher unit negative accumulated ecological effect
- Lack of forests (result of early industrialization) => lower environmental recovery capacity (ability) => GHG **emission exceeds** its natural absorption (by 4 times?) => EU is **GHG net-emitter** (like US, China, India...)

To find the balanced economically justified & mutually acceptable joint solutions

Russia

- Industrialization started much later
- Large territory, lower density of population – much lower unit negative ecological effect
- Large territories covered with forests => highest environmental recovery capacity (ability) => GHG **natural absorption exceeds** its emission (by few times?) => Russia is **GHG net-absorbent** (plus other 4-5: Canada, Brazil, Australia, New Zealand and (?) Sweden)
- Too early switch to posterior technological steps in decarbonization chain of actions in Russia might be counter-productive => historical lessons:
 - from 1980-ies: Caspian Sea level vs water transfer from Siberian Rivers proposal;
 - from 1960-ies: Verkhneobskaya (Higher-Ob) hydro power station proposal
- Export-oriented decarbonization?

EU & Russia: two different approaches (starting positions) to gas decarbonisation shall not disunite the parties

EU approach/priority (**gas infrastructure only**)

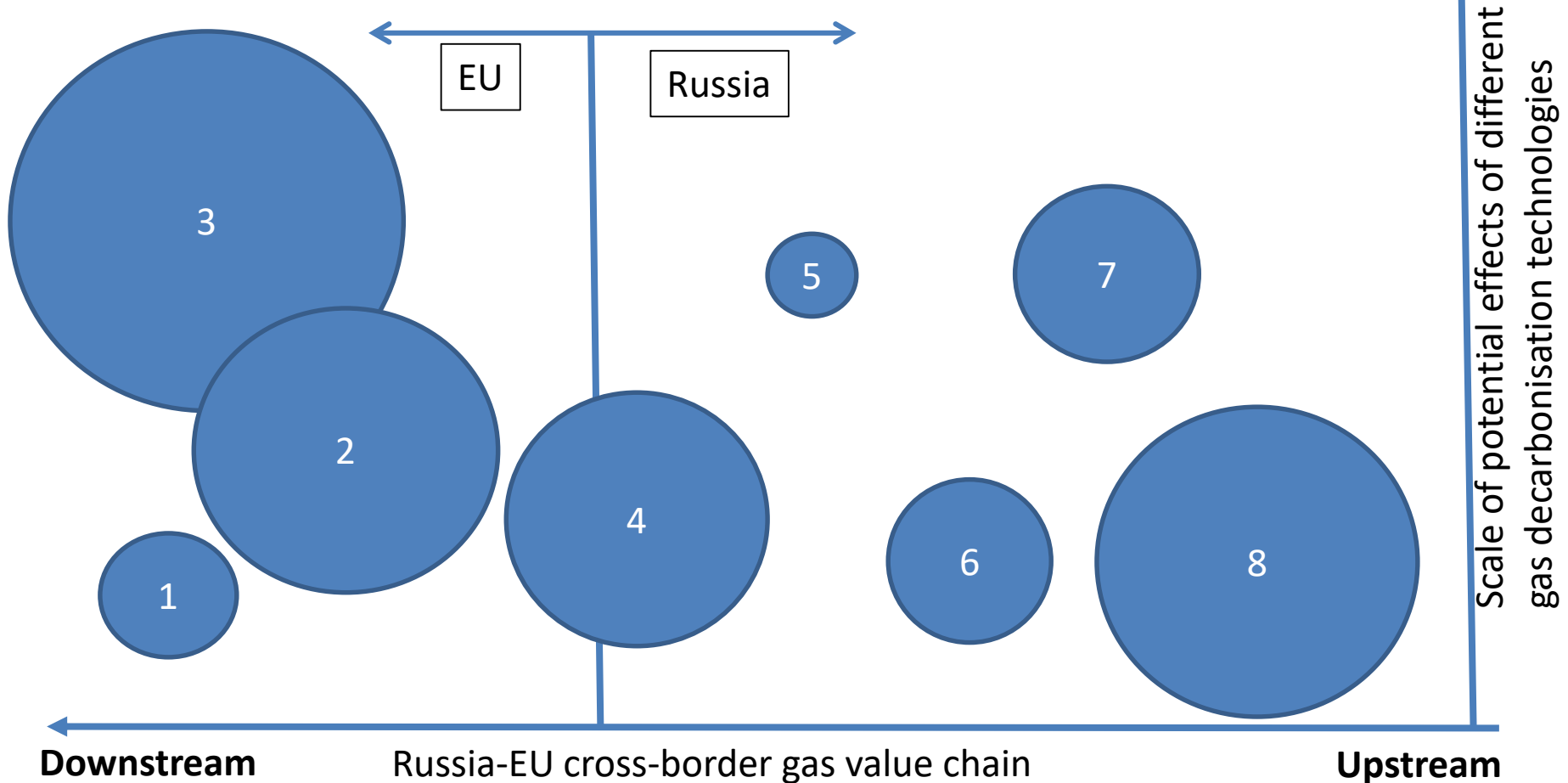
- To convert excessive renewable electricity (when available, and thus at zero or negative price), a non-storable energy good, into storable energy commodity – hydrogen (and thus to further pay back past state subsidies for RES)
- CCS will be needed
- To use available **gas infrastructure** for this purpose
- Decarbonisation is the definite immediate target (R.Dickel: “We have the target – how to reach it”)
- + by-product: to diminish import dependence (to substitute dirty foreign molecules by clean domestic electrons)

Russia approach/priority (**both gas resources & gas infrastructure**)

- To monetize its vast gas reserves / resources as, first, substitute for other (much more dirty) fossil fuels, secondly, as the resource for its further decarbonization within the Russia-EU cross-border gas value chain at its segment where common benefit is the highest
- No need in CCS (if methane decomposition)
- To use available **gas resources & infrastructure** for this purpose
- Decarbonisation is rather the immediate means for gas monetization than the immediate target by itself => “if Russia wants to help EU to build (become the first) H2-based economy...” (M.James/M.Hafner) => not at the price of losing Russia’s current competitive niches / advantages in energy sphere

Decarbonisation in Russia & in EU are two different stories, BUT common denominator (though within different priorities): available cross-border Russia-EU capital-intensive immobile gas infrastructure NOT to be converted into stranded asset in case gas is NOT considered as just “transition (bridge)” fuel => material background for Russia-EU cooperation in decarbonisation

Conceptual (technology-neutral/non-discriminative) approach: joint evaluation of potential implementation effects of different gas decarbonisation technologies at different segments of the Russia-EU cross-border gas value chain as the means to find the balanced (mutually beneficial) solution



NB: figures = technologies; effect (an option) = “cost-plus” price (at end-user) of 1 kg of Hydrogen (center of circle); size of circles = measurable effect (both sides to jointly decide: what to measure & how to calculate; an option = market for hydrogen in specific sectors compared to alternatives); size of circles purely illustrative

Joint debates lead to additional possible options => 14.11.2018



- Solution for country with gas resources might be different from countries without gas resources (M.James), as well as for countries with gas resources but in different geographical locations (different distances from the EU market for Russia & Norway)
- Trilateral search for best decarbonisation option (?)
 - Available CO₂ storage capacities in Norway might stimulate increased gas export from Russia to EU for decarbonisation downstream EU both without & with CO₂ => CCS for H₂ + CO₂ for EOR in Norway ?

“Time is the essence - & cooperation” (R.Dickel)

- ...but fast gas system transformation from CH₄ to H₂ without adequate assessment of all reasonably possible decarbonisation alternatives create the risk of inadequate investment decisions which are “the highest threat to international energy security” (B.Nitzov/ECS for G-8/2006/SPB)
 - “to develop a totally new grid system of a scale that never existed before in a very short period of time” (J.Ball)
- Cooperation Russia-EU:
 - ...is between sovereign states => national priorities does matter,
 - ...does not mean export of one party’s approach to decarbonisation, but joint assessment of different alternatives among broad range of available options,
 - Integrated joint study – technologically neutral approach

Thank you for your attention!

www.konoplyanik.ru
andrey@konoplyanik.ru
a.konoplyanik@gazpromexport.com

Disclaimer: Views expressed in this presentation do not necessarily reflect (may/should reflect) and/or coincide (may/should be consistent) with official position of Gazprom Group (incl. Gazprom JSC and/or Gazprom export LLC), its stockholders and/or its/their affiliated persons, or any Russian official authority, and **are within full personal responsibility of the author of this presentation.**