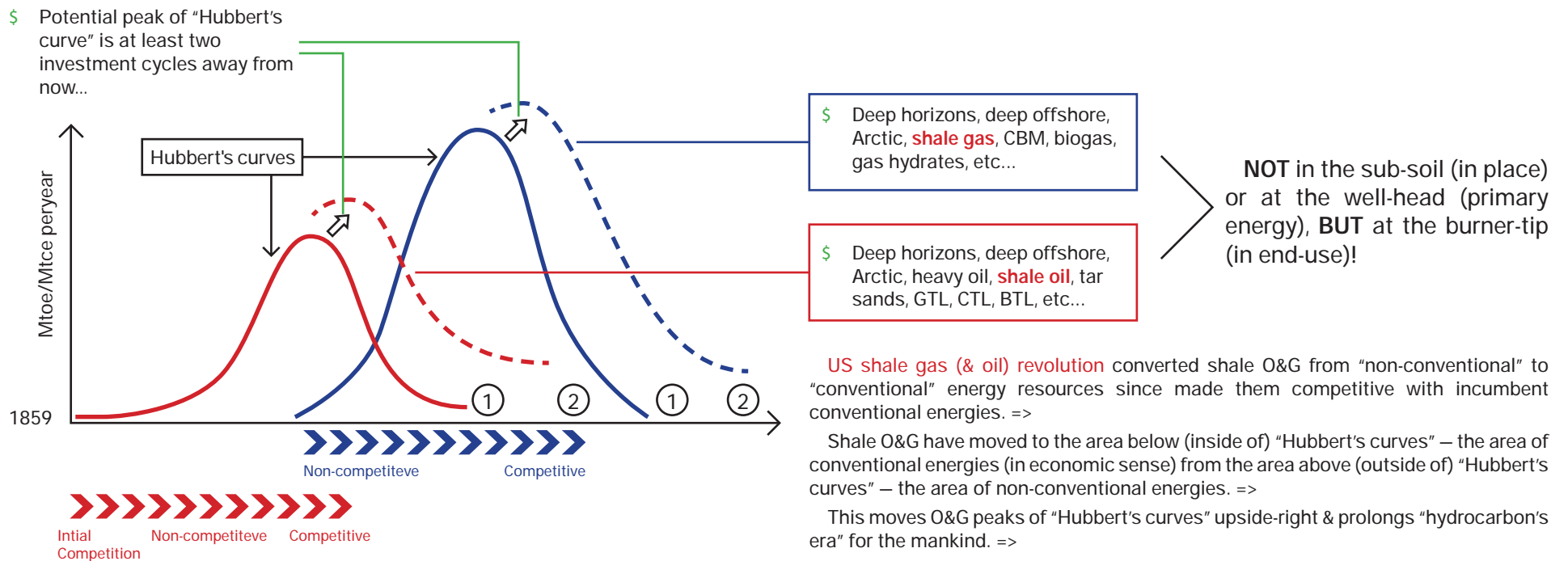


ANNEXURES

Figure 1.
Economic interpretation of "Hubbert's curves" (acc. to Konoplyanik)



US shale gas (& oil) revolution converted shale O&G from "non-conventional" to "conventional" energy resources since made them competitive with incumbent conventional energies. =>

Shale O&G have moved to the area below (inside of) "Hubbert's curves" – the area of conventional energies (in economic sense) from the area above (outside of) "Hubbert's curves" – the area of non-conventional energies. =>

This moves O&G peaks of "Hubbert's curves" upside-right & prolongs "hydrocarbon's era" for the mankind. =>

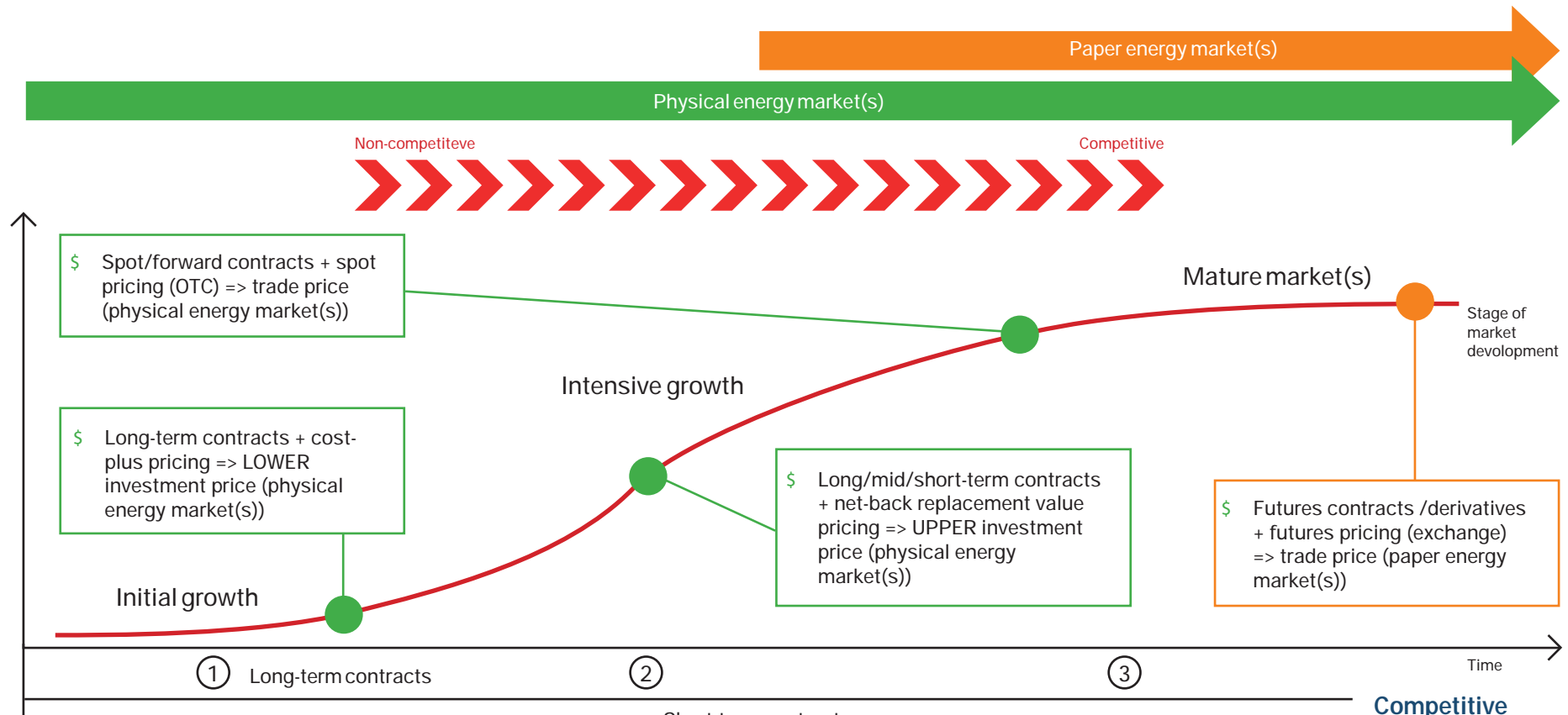
This means (acc. to Konoplyanik), we are living within left rising branch(es) of energy markets development' "Hubbert's curve(s)"

⇒ Shift of "Hubbert's curve" in the foreseeable future due to economic and technical factors

① Conventional oil and gas resources as of today

② Unconventional and gas resources as of today which will become conventional ones in the future

Figure 2.
Evolution of international O&G markets: correlation between market development stages, contractual structures, pricing mechanisms and multi-facet competition at the rising branch of “Hubbert’s curve”



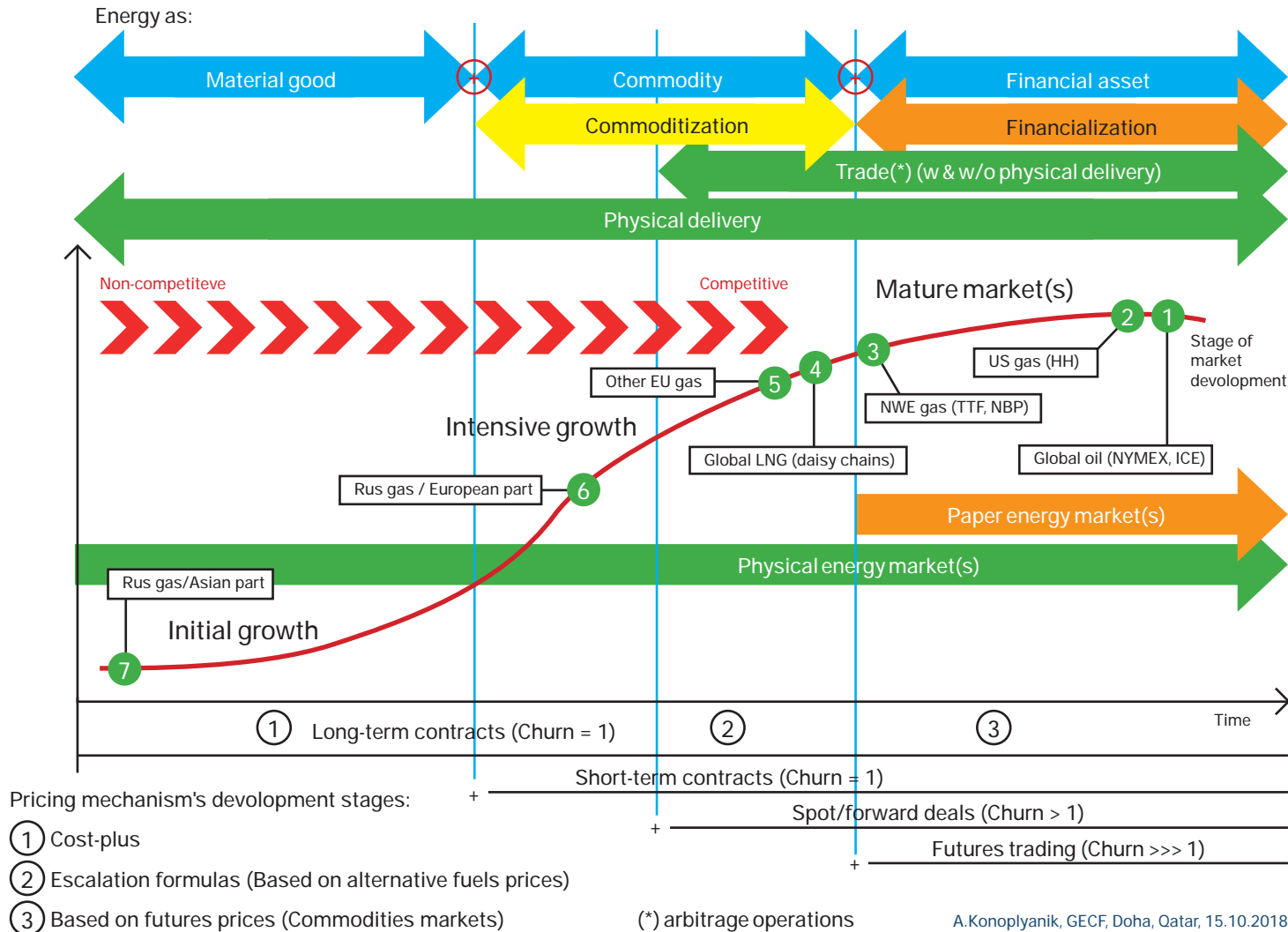
Pricing mechanism's development stages:

- ① Cost-plus
- ② Escalation formulas (Based on alternative fuels prices)
- ③ Based on futures prices (Commodities markets)



Competitive choice is “in addition to” and NOT “instead of” rule !!!

Figure 3.
Evolution of international O&G markets: correlation between market development stages and markets liquidity at the rising branch of “Hubbert’s curve”



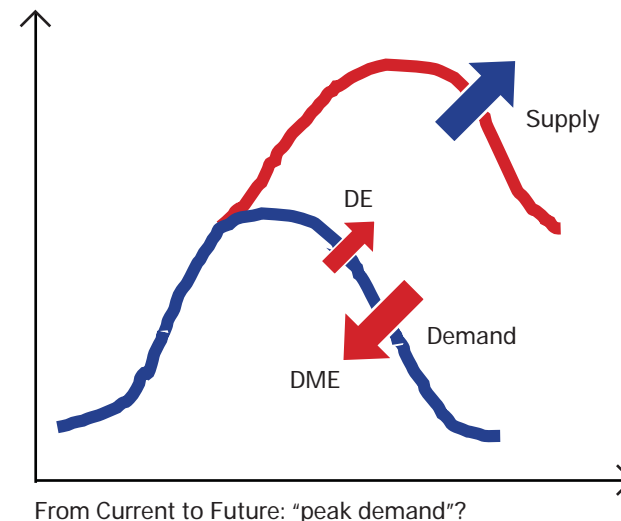
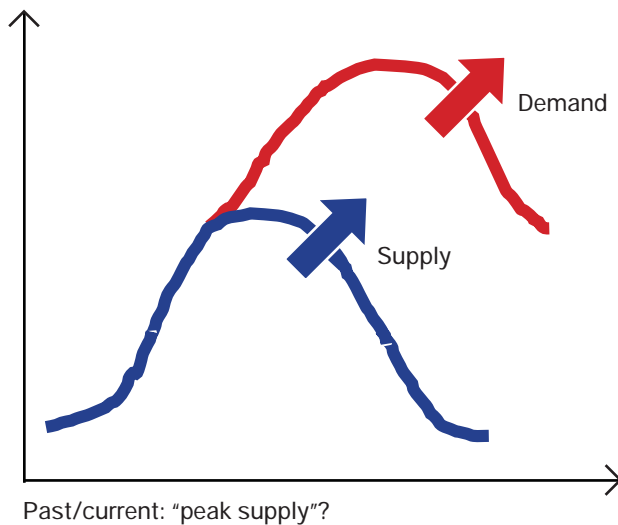
Energy markets vs Churn rates

Energy, marketplace	Churn (appr.)
Global oil (NYMEX, ICE)	2000
US Gas (Henry Hub)	300-400
NWE gas (TTF)	25-45
NWE gas (NBP)	10-15
Other EU gas	3-5 & less
EU GTM benchmark	8
Vision EU gas business	15
Global large-scale LNG (OTC/daisy chains)	(single digits?)

Figure 4.
World Energy: The Change of Paradigm?

SUPPLY	DEMAND
<ul style="list-style-type: none"> - Hubbert peak (curve) - Hotelling rent (theorem) - Chevalier turning point - STP (resource rent, economy of scale) - International law (access to resources) 	<ul style="list-style-type: none"> - Economic growth (industrial-type, supply centralization & concentration) - Population growth
<p>Future energy supplies (NRES) more costly & limited (depletion rent) => low-cost NRES wins more rent, development of high-cost NRES delayed</p>	

SUPPLY	DEMAND
<ul style="list-style-type: none"> - STP (technological rent, e.g. US shale revolution => Hotelling anti-theorem) 	<ul style="list-style-type: none"> - Four steps in departure from oil since 1970-ies - Energy efficiency (delinking energy demand & economic growth, post-industrial-type) - COP-21 (upper limit/GHG emissions) - New type of economic growth in poor(est) DE (non-industrial, decentralized) & in DME (post-industrial)
<p>Future energy supply less costly & plentiful (partly due to demand limitation?) => competition among energy suppliers increases => low-cost NRES wins & takes all market, high-cost NRES cut-off</p>	



Competition at international gas markets tightens

DE – developing economies,
 DME – developed market economies,
 STP – scientific & technical progress
 COP-21 – Paris climate agreement 2015 ("Conference of Parties")
 NRES – non-renewable energy sources

Figure 5.

Two forming circles of future gas supplies to Europe: “disrupted” circle of global LNG supplies and integral with internal backup circle of Russian pipeline gas supplies

