



ROSATOM

INTEGRATED OFFERS AT THE WORLD MARKET OF NUCLEAR FUEL CYCLE PRODUCTS AND SERVICES

TENEX

June 2016



- ✓ Nuclear power is an environmental friendly and clean electrical power source for today and for the future



- ✓ Nuclear power successful development cannot be achieved without an effective fuel supply system, integrating fuel and its components procurement with spent fuel and radioactive waste management



- ✓ Integrated front- and back-end approach facilitates using unique competitive advantages of ROSATOM facilities and is an efficient means of promoting their products and services to the world market

TENEX presence at the world NFC market: Key facts

TENEX



Over 40 years of active presence at the Western SWU market

We supply more than 30 customers in 16 countries

24% SWU market share for Western design reactors in 2015

Strong export order book with an approximate value over \$23 bln.

Developed logistic infrastructure and supply chain

Global Enrichment Market Evolution

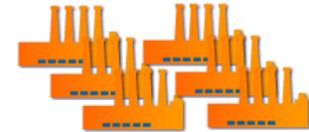
Competition

The only supplier (USA) to the Western SWU market

The USSR enters the Western SWU market

More diversification on the supply side, market becomes more competitive

Multiple suppliers, further competition increase



Before 1970s



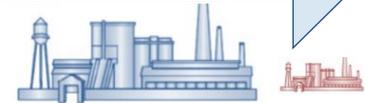
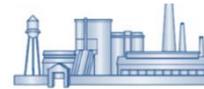
Early 1970s



Late 1970s – 2000s



2010 – 2020



Diffusion technology

Increasing role of centrifuge technology

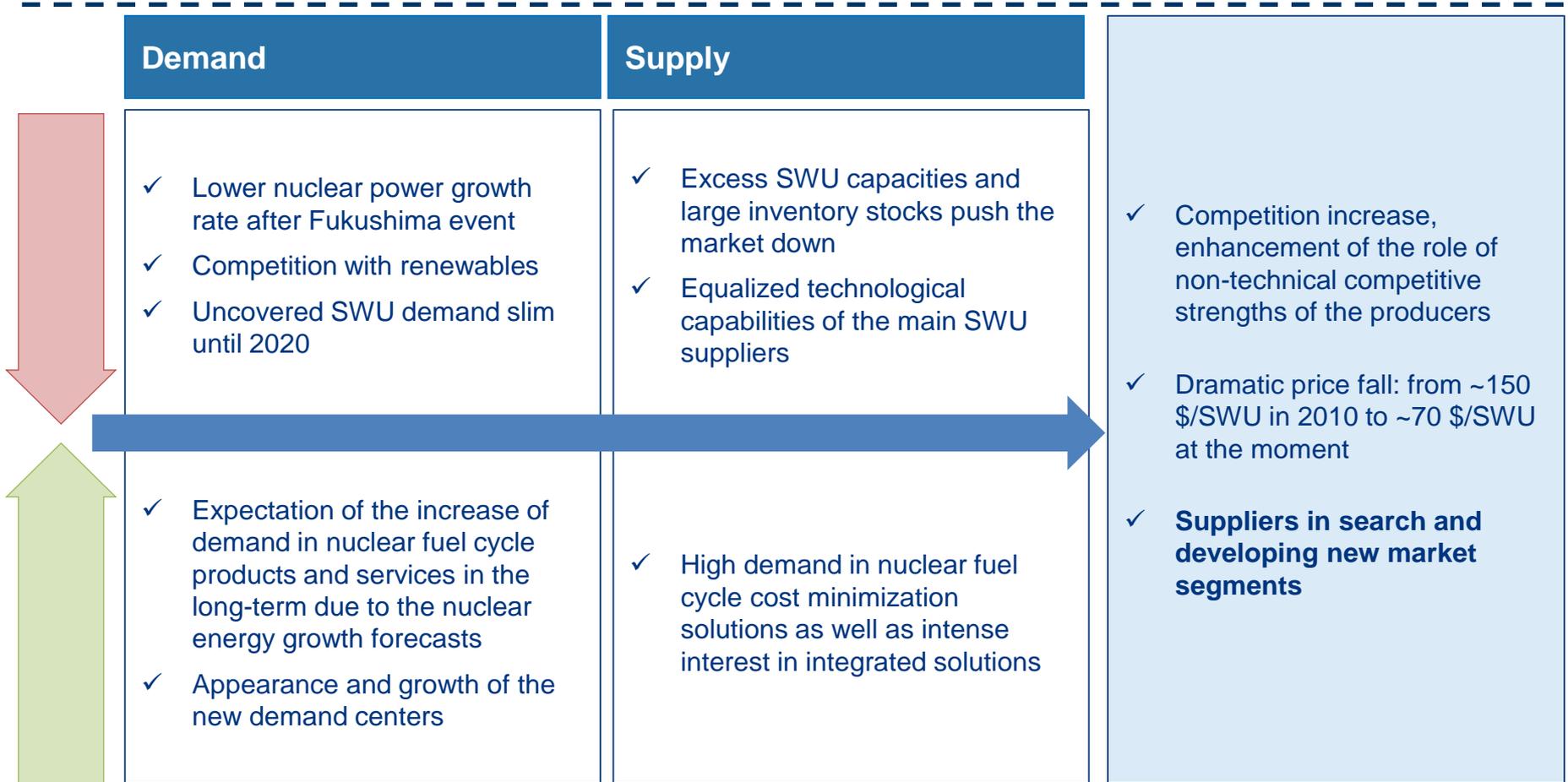
Diffusion replacement with centrifuge technology

Gas centrifuge technology dominates

Laser technology commercialization plans

Technology

Global SWU market. Current trends



- ✓ Current SWU market is unfavourable for producers, with weak demand, oversupply, and aggressive SWU marketing from both primary and secondary suppliers, resulting in unprecedented drop in price
- ✓ The market will rebalance in long-term, however, suppliers entering new market niches will gain the advantage

Global SWU market. New segments

Current traditional SWU market conditions encourage suppliers to look for or develop market segments, where new opportunities for enrichment services may be forecasted

Off-spec U processing
(including enrichment)

EUP supply as an integrated
product

U production through
underfeeding

Advanced types of fuel
(both for NPPs in
operation and planned)

RepU

Slightly
irradiated U

- ✓ Rosatom/TENEX see great potential for suppliers and substantial value for customers in these segments.
- ✓ Market gives signals that in the near future utilities may become interested in spent nuclear fuel processing.
- ✓ One of the topical and promising directions is enrichment of off-spec U feed (specifically RepU). For a number of countries RepU recycling may be a choice in a LT perspective. However, for countries/utilities adhering to the closed NFC it is a decision of the nearest future.

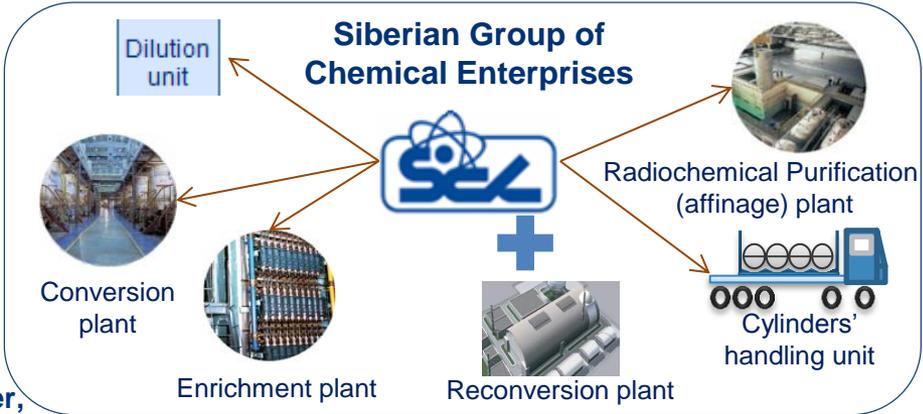
Value for Customers

Sustainability	Security of supply	Economics
<ul style="list-style-type: none"> Lowering of NFC aggregate impact on environments Mitigating the risk of having RepU requalified as a waste 	<ul style="list-style-type: none"> Additional security and effectiveness of supply due to a genuine energy reserve Opportunity to diversify utilities' strategies in the area of fuel procurement 	<ul style="list-style-type: none"> Costs (price) predictability due to absence of volatility in RepU prices as compared with NatU prices Avoidance of SNF/RepU LT storage costs

More sustainable, green and effective NFC

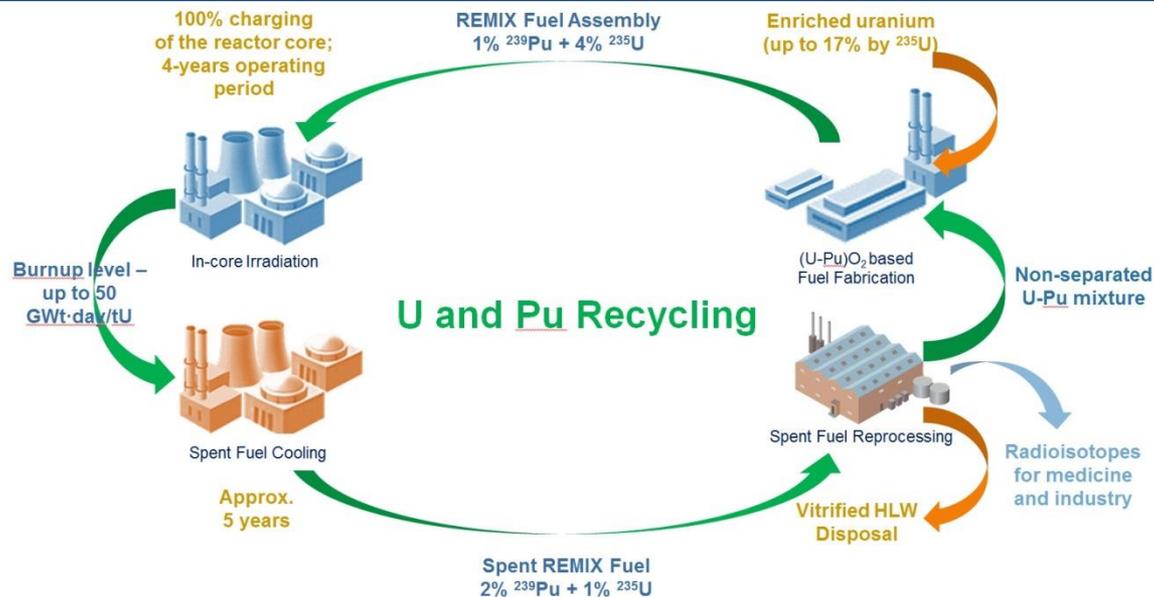
Russian RepU Treatment Offer

- ✓ Vast experience in purification, conversion and direct enrichment of both Russian and non-Russian RepU
- ✓ Technical possibility of using or combining direct enrichment and blending processes
- ✓ Product is not standardized, actual characteristics depend on characteristics of RepU feed and customer's requirements to fuel
- ✓ Concentration of RepU processing cycle up to enrichment stage (inclusive) at one industrial site (SGChE)
- ✓ **Taking RepU treatment services, our customers may also order other NFC products and services within integrated offer, that improves effectiveness of their nuclear facilities in operation**



Advanced Type of Fuel. REMIX Nuclear Fuel Cycle

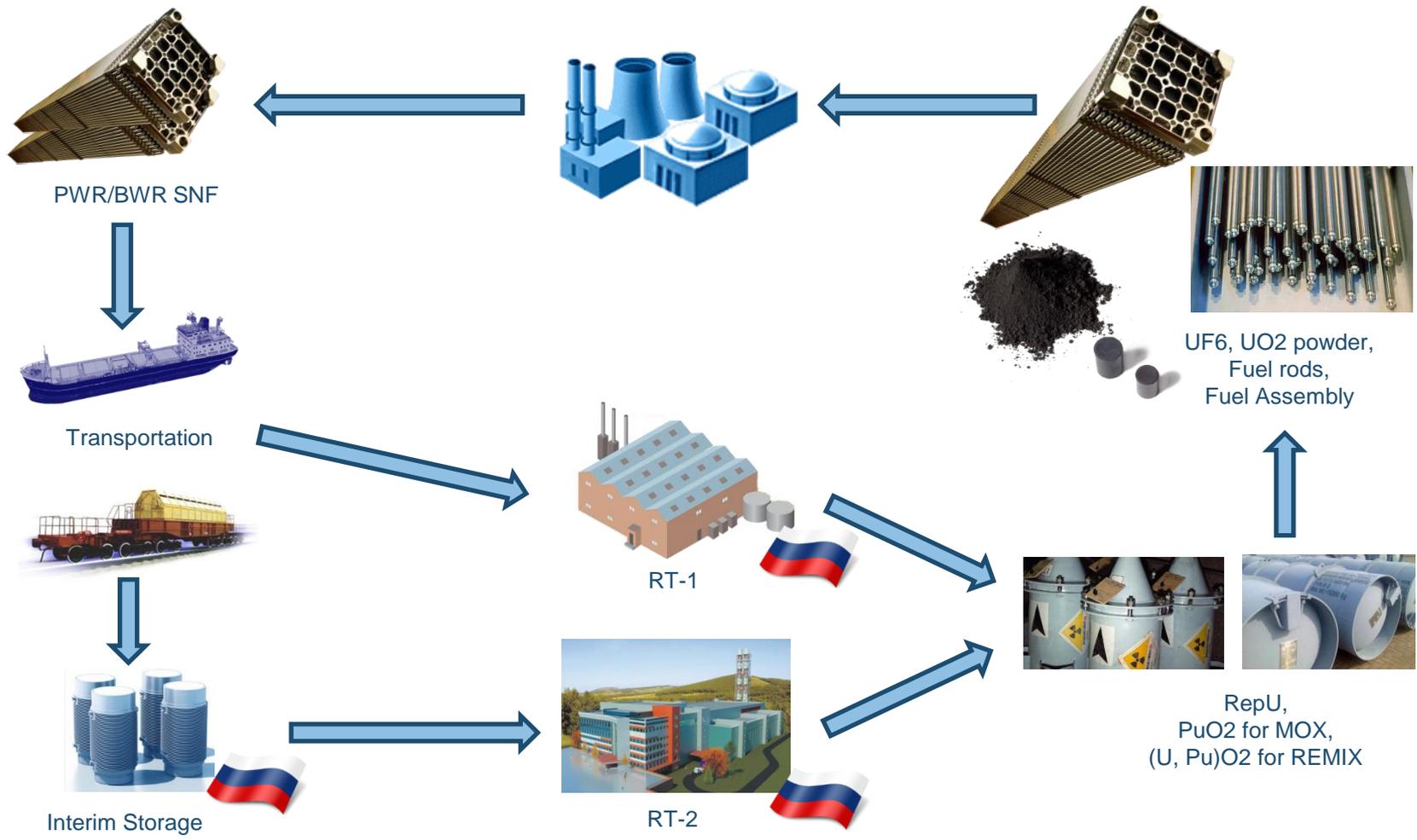
Elements of advanced closed NFC being developed by Rosatom
(based on the on-going R&D)



Features of advanced NFC on the basis of REMIX-fuel

- 20% -30% saving of natural U
- Avoidance of SNF long term storage costs
- Avoidance of the unpredictable increasing SNF disposal expenses
- Stable fuel supply (U does not leave NFC)
- Up to 5 possible recycles of U and Pu
- Content of Pu in REMIX-fuel is much lower than in MOX-fuel
- Significant reduction of SNF volumes
- No need for the Customer to develop back end infrastructure

Standard ROSATOM Integrated Offer



✓ Timely and effective fuel supply is a cornerstone of global nuclear power development

✓ Integrated offer is a modern approach responding to realities of the global NFC market development

✓ TENEX already has operational experience in providing EUP produced from different types of feed (including RepU) to the market

✓ Other cooperation options may include: solutions in SNF storage, transportation, SNF reprocessing, radioactive waste management. Rosatom also works on development of advanced SNF reprocessing technologies that would allow in future to introduce to the market nuclear fuel of a new type

We believe that an integrated offer combining front-end and back-end components has a significant potential and in our long-term marketing strategy we emphasize the important role of the business based on integrated offers

Thank you for your attention!