TECHSNABEXPORT—RUSSIAN ENRICHMENT OVERVIEW

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The changing uranium enrichment market: a view from Russia

The main issue I would like to focus on in my report is how, looking from Russia, we view the changes that are occurring on the enrichment market and how we see our role in these market changes.

Let me stop briefly on the market trends we consider to be most important..

The first one relates to the overall moderate growth of demand (See Slide 1)

According to a forecast of the World Nuclear Association the demand for uranium enrichment services in 2002 is about 35 million SWU. It is expected that there will be a need for 5 million SWUs in addition to that with the overall demand reaching approximately 40 million SWUs by the year 2010.

The regional aspect shows that the biggest contribution to the demand growth will made by South-East Asian and Far East countries, setting this region in the same range as two other important markets - USA and Europe. Special notice should be taken of the Soviet- and Russian-design nuclear power plants (Market of Russian Design Reactors– MRDR) and their requirements. (Geographically this is the area of Russia and other countries of the former USSR, Eastern Europe and potentially – a part of the Asian market). A long-term nuclear energy development strategy that has been adopted in our country includes large-scale plans involving the commissioning of new nuclear power facilities, the extension of reactor operation life, the increase of existing reactor operation effectiveness. About all of this I will speak later in more detail. With the addition to these plans of existing projects for the construction of new VVER-1000 reactors abroad, the significance of the MRDR market could increase substantially.

Moving from the demand situation to general history and how it affects long-term market developments, I'd like to note the following.
The market is heading towards greater competition and, inevitably, commercialization. If compared with last century's mid-seventies when a sole supplier, the US Department of Energy, dominated the market, today's situation is certainly a drastic change. First – there was the entrance of Tenex into the market, and later on, with the emergence of Urenco and Eurodif, the market changed even more. Today the market shares of these suppliers are becoming more equal in size. Let's take the US market as an example. On the Slide 2 we have data reflecting the structure of SWU purchases made by US utilities in 2001 by country of origin. As you can see within the structure, the sector that is

not covered by the HEU-LEU material is evenly covered by SWUs, produced by all of the world's largest suppliers.

The gradual diminishment of government interference is followed by a growth of competition that designs market mechanisms and determines market rules as it develops. The first fact largely has to do with the privatization of USEC some years ago. I would describe this trend as a "movement in the direction of greater commercialization". At the same time it must be noted that this is indeed a "movement " as the influence of various free trade barriers is still very strong and disruptive to the market, which, as a result, functions less effectively. Our awareness of these barriers, meaning the USA limitations on Russian SWU import, determined by the Antidumping Suspension Agreement, and the special policy Euratom has for Russian SWUs, is especially acute. As latest events show, not only is the number of barriers not decreasing , new ones are being added, and we are now not the only ones to suffer from that inconvenience.

As to the supply side of the enrichment market the most important trend now is undoubtedly the need for technological rejuvenation(See Slide 3).
Although the gaseous diffusion technology is still a big part of world capacities (we estimate its share in the world still to be over 40%), the centrifuge technology is the only technology that has proven its right to be considered realistically viable, an effective alternative and capable of becoming dominant already by the end of this decade. As you know, Russia had put its stakes in this technology a long time ago and now has the biggest centrifuge separation facilities in the world.

The need for technologically advanced re-equipment is dictated not only by such factors as the morally and physically outdated state of the gaseous diffusion technology or the need for advantage over competitors etc. The deregulation of energy markets, going on in many countries, makes it important to ensure the stability of nuclear fuel costs to uphold the competitiveness of world nuclear energy against of growing pressure from other energy generation sources. It's obvious that the fuel component is not the main part of NPP energy generation costs, however life today is an on-going every-day fight for every mills per kWH in the battle to bring down costs. Thus, the enrichment stage, as the main fuel cost component, should have reserves to support long-term fuel prices at an acceptable level, in case serious price changes occur in other markets of nuclear fuel cycle, where the situation today is to a great degree uncertain. A small illustration of this can be seen on Slide 4. Let's consider a hypothetical case of natural uranium prices rising 50% above today's market. If the SWU and fabrication prices remain at the current level, the fuel price will rise by more than 12%. In absolute terms it would mean the price growth of the fuel component from 4.6 mills/Kwh (the average level for all US NPP according

to Nuclear Fuel Vol.27 No. 16) up to 5.3 mills/Kwh, that obviously many in our industry would consider a disappointing fact, keeping in mind the competition from coal and gas. To neutralize this growth, the SWU price would have to be brought down 25% off the current market. Of course, these estimates are largely illustrations and very conditional. For instance, a certain level of optimization would be achieved by changing the U-235 tails essay. Nevertheless, they do reflect the tendency. And it is obvious that the gascous diffusion technology does not have the potential to "neutralize" the effect of prices for other nuclear fuel cycle components rising.

The analogy this structure suggests is a traffic signal. Today's state of affairs could be described as a "yellow light" – attention. The situation with the enrichment market's related markets is uncertain, the existing technological structure of the enrichment industry is not optimal and has no "safety margin" left for the optimization of costs. The situation with a significant rising of the prices in related sectors while maintaining SWU production costs on current levels could be described as a "red light". And only the situation with the domination of an advanced technology could be characterized as a "green light-go" to the future development of nuclear energy, giving it the necessary "safety margin" to eliminate the effect of market instability, and that is a serious, extra factor for our industry's competitiveness.

To finish with the supply trends review, let's talk about one interesting tradition and our thoughts on it.

Whenever the enriched uranium market is mentioned, the thesis that it is to a large extent unbalanced because the capacity surplus significantly exceeds reactor requirements is one that is sure to be heard, it is something of a tradition. Indeed, a comparison of figures of rector requirements with those of world production capacity gives the impression of a difference of over 10 million SWUs of production capacity. This disproportion seems even larger when the weapons grade material that comes to the market is added to it. Although in our opinion the situation is not so dramatic. First, there is the issue of economical capacity: how much gaseous diffusion capacity is in fact used by plants and how much capacity is economically optimal at the existing price level and contract terms and conditions for supplies of electricity to gaseous diffusion plants and should be considered in the calculation of the supply/demand balance. According to World Nuclear Association ("The global nuclear fuel market 2001") the gaseous diffusion plants are operated now at 70% of their capacity. 30% of unused capacity will halve the gap between supply and demand. The second main factor is the way separation plants are used in Russia. A considerable part of that capacity is working to supply enriched uranium to Russian NPPs and foreign NPPs of Russian design and to implement HEU-LEU program. A certain part is used to enrich tails from foreign enrichment plants

and this usage affects the situation on the natural uranium market rather than the SWU market. Therefore, it is worthwhile to mention that, although enrichment capacities exceed reactor requirements, the market is substantially more balanced than it could seem at first glance.

Speaking about the increasing importance of the Russian domestic demand to the operation of Russian enrichment enterprises, I would like to address in more detail the prospective for the development of Russian nuclear energy production. Currently 10 Russian nuclear power plants operate 30 reactor units with a nameplate capacity of 22,2 GW. During the last several years one could observe the growth of electricity production, which is mainly attributed to the increase of the capacities load factor. According to the data, provided by "Rosenergoatom" a holding company, that currently incorporates all Russian commercial NPP's, 134.9 Net- TWH of electricity were generated in 2001, representing 104,7% of the 2000 amount. In 2001 for the first time after a long interruption in building the new capacities, the new reactor unit "Rostov (Volgodonsk)-1" commenced its industrial operation. As a result, the capacity of the Russian NPPs' represents currently 11,5% of the total nameplate electricity generation capacities and contributes 15,5% to the total electricity generation in the country.

The long-term "Strategy For the Development of Atomic Energy in Russia in the First Half of the XXI Century" adopted in Russia determines the accelerated growth of the share of the nuclear energy in the overall energy balance of the country. According to this document, it is contemplated that by 2020 the nameplate capacity of the Russian NPPs shall increase to hit the level from 35,8 GW (under the low-case scenario) up to 50 GW (under the high-case scenario). At the same time, the net production of electricity in the framework of these scenarios shall be between 235 up to 372 TWH. Basing on the Strategy mentioned before and other documents, determining the energy policy guidelines and adopted by the Government, "Rosenergoatom" has worked out a more detailed investment program, required for the development of the nuclear energy in 2002-2005 and further on till 2010. Extending the lifetime of the existing reactor units and increasing the effectiveness of their operation, finishing last stage and half-way stage unit construction as well as building new NPPs on the pre-prepared sites are among the priorities under this program. Information reflecting the planned growth of electricity generation and start of operation of the new capacities is given on Slide 5. "Rosenegoatom" estimates that only the extension of the lifetime of 5 first generation reactor units in the period till 2005 will be equivalent to the construction of new units with a total capacity of 3,2 MW. Currently active work is being done at existing sites to finish the construction of 4 units that are today 65% to 75% ready and these units are expected to start operating between 2004 and 2007. It is further planned that 5 more units will be put into the operation between 2008 and 2010.

As the result, it is projected that by 2010 the installed capacities will go up to 29 GW with the growth of electricity generation up to 212 TWH . It is important to mention that the latter figure is 157% of the 2001 nuclear electricity generation. Accordingly, the reactor demand of the Russian NPPs in the nuclear fuel will grow in a similar manner. Also, Russia's obligations to supply nuclear fuel to Russian – design NPPs that are currently being built abroad and that will have a total capacity of 5 GW, can't be disregarded.

All of the above factors will, doubtless, contribute to the growth of that share of the enrichment capacities that are allocated to satisfy these domestic requirements.

Export from Russia of enrichment services and products, containing such services, is traditionally conducted by TENEX. Several years ago, in the course of MINATOM's restructuring, a new Russian supplier - Joint Stock Company "TVEL" entered the market. JSC "TVEL" mainly supplies fuel assemblies for the MRDR market and is, therefore, also indirectly a player on the enrichment services market.

Now to say a few words about the presence of TENEX on the enrichment services market. TENEX had entered the western enrichment services market in last century's mid-70-s, when a number of the long-term contracts had been concluded with several European customers. By the end of 70-s, after signing commercial contracts with the majority of this region's utilities TENEX had already gained strong positions on the European market. The further development of export proceeded in two directions. The first one was based on the expansion of the range of products offered for export and the development of projects beyond the framework of the generic "commercial" SWU market. By saying this I mean, first of all, the beginning of EUP deliveries at the end of the 80-s and, in the later years – the implementation of the projects dealing with the weapon – grade materials (the HEU Contract), the enrichment of the reprocessed uranium belonging to foreign customers, and the upgrading of western enrichers' tails material. The second direction had to do with the expansion of the geography of the sales. In the end of 80-s the United States clients and a little bit later – the Asian clients joined our European customers. We are satisfying a significant share of the nuclear energy requirements of South Korea. We are actively working with Japanese utilities, first contracts for the delivery of SWUs to Japanese NPPs have been concluded and successfully implemented. Today we are covering a significant portion of the worldwide market requirements in uranium products.

Regretfully, the growth of Russian SWU export in the 90-s was followed by the imposition of restrictions both in the United States and in Europe, which are inconvenient not only to us, but also to our potential customers.

Deliveries of the uranium products and services to the United States, effected during the last decade, were a significant portion of Russian export. That is why we are particularly sensitive about the situation and developments in this area. Regretfully, the provisions of the Suspension Agreement and the underlying investigation, initiated back in 1991, today strictly limit our access to U.S. utilities. On the other hand, in the first half of the 90-s the Suspension Agreement played a certain positive role. It had given a "green light" to the HEU – derived SWUs and gave some possibilities to supply commercial SWUs under the "grandfathered contracts" and matched sales program with USEC.

On Slide 6 it is shown that starting from 1993 and till 2002, HEU-derived SWU coexisted on the market with the sales of the "commercial" SWUs to U.S. utilities. The maximum volume of deliveries of the "commercial" SWU under the matched sales program and "grandfathered contracts" was achieved in 1995 – 1996, when the HEU program has not yet achieved the nominal rate of deliveries of 5.5 MM SWU per year. However, this coexistence continued in 1999 and later years, when the deliveries of the HEU – derived SWU have already reached the nominal level. Starting from 2003, the existing Suspension Agreement does not give any opportunities to sell "commercial" Russian SWUs, and Russian – origin SWUs will be present on the U.S. market solely through the deliveries under the HEU Contract.

A comparison of delivery volumes under the HEU Contract and under commercial contracts is a clear demonstration that the mechanism by which Russian enrichment services are given limited access into the US market provided through the terms of the Suspension Agreement did not destabilize the market. Of course we understand perfectly well and are fully ready to consider the whole range of factors that influence the US market and the American enrichment industry today and will affect them in the future. At the same time we think that a certain level of cooperation between us and American utilities could very well be continued upon the consensus between the US Department of Trade, US domestic suppliers and consumers in the future.

Speaking about our movement in the direction of developing the Russian market infrastructure, it is impossible not to mention the significant steps, which our country (and foot-in-foot with it – our nuclear industry) made during the last decade and continues to make now. In recognition of these steps, this summer the United States have declared the market economy status of Russia, the European Union is going to do the same already this fall. The negotiations on Russia's accession to the World Trade Organization are progressing rather actively, and there are expectations, that this could happen already in the next year.

One XIX-th century philosopher said *"it is impossible to live in the society and be free from the society"*. Rephrasing him, I would say that the Russian Government and we – its commercial agent comprehend now quite well that *"it is impossible and not worthwhile to live in the market and be free from the market rules"*. In other words, Russia is striving to become a peer player on the word markets and to adhere to the rules of the game called competition, even though in some cases this process might be burdened by substantial costs.

Nevertheless, we are ready to proceed further in this direction and, from our side, we expect that market participants will react positively to this movement, and that Russia will be regarded in the United States and in other countries as a long term reliable and effective supplier of SWUs, produced by an advanced and most effective technology.

NEI INTERNATIONAL URANIUM FUEL SEMINAR 2002

Enrichment Market: A Look from Russia

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TENEX

NEI

Slide 1

Demand - Key trends

- Moderate demand growth – 35 MM SWU (today) to 40 MM SWU (2010)
- Asian market will become as large as US and European
- The role of Market of Reactors [illegible] Design (MRDR Market) will also increase

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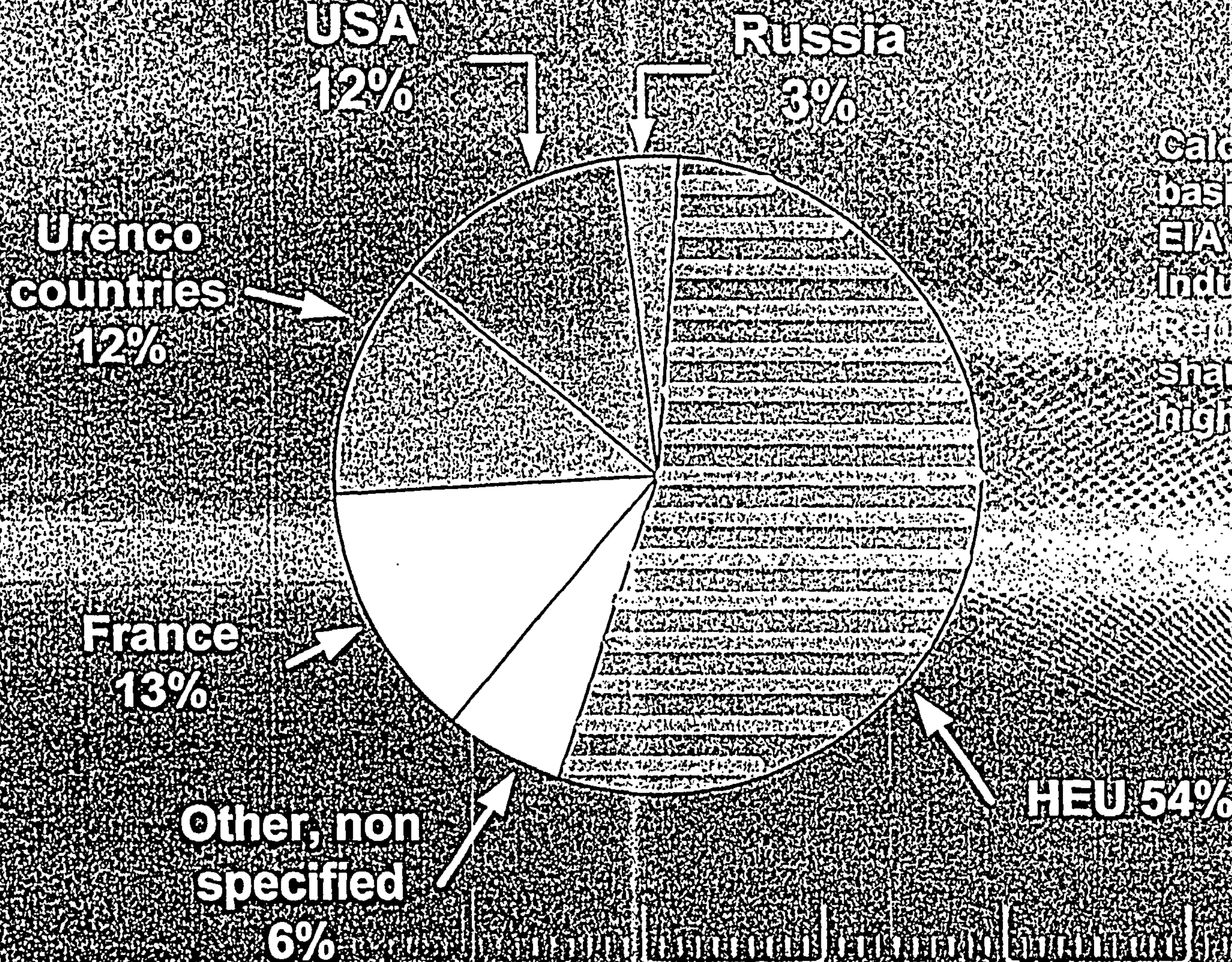
Slide 2

NEI International Uranium Fuel Seminar 2002

SWU Purchases in the US by Countries by Origin in 2001



Calculated on the basis of the data of EIA DOE Uranium Industry Annual Report 2001. The share of HEU is highlighted.

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Slide 3

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Supply – Key Trends

- The centrifuge technology share increases – today about 60%.
- Russia relies on centrifuge technology and has the world's largest capacity.
- By 2010 centrifuge technology will likely to become dominant.

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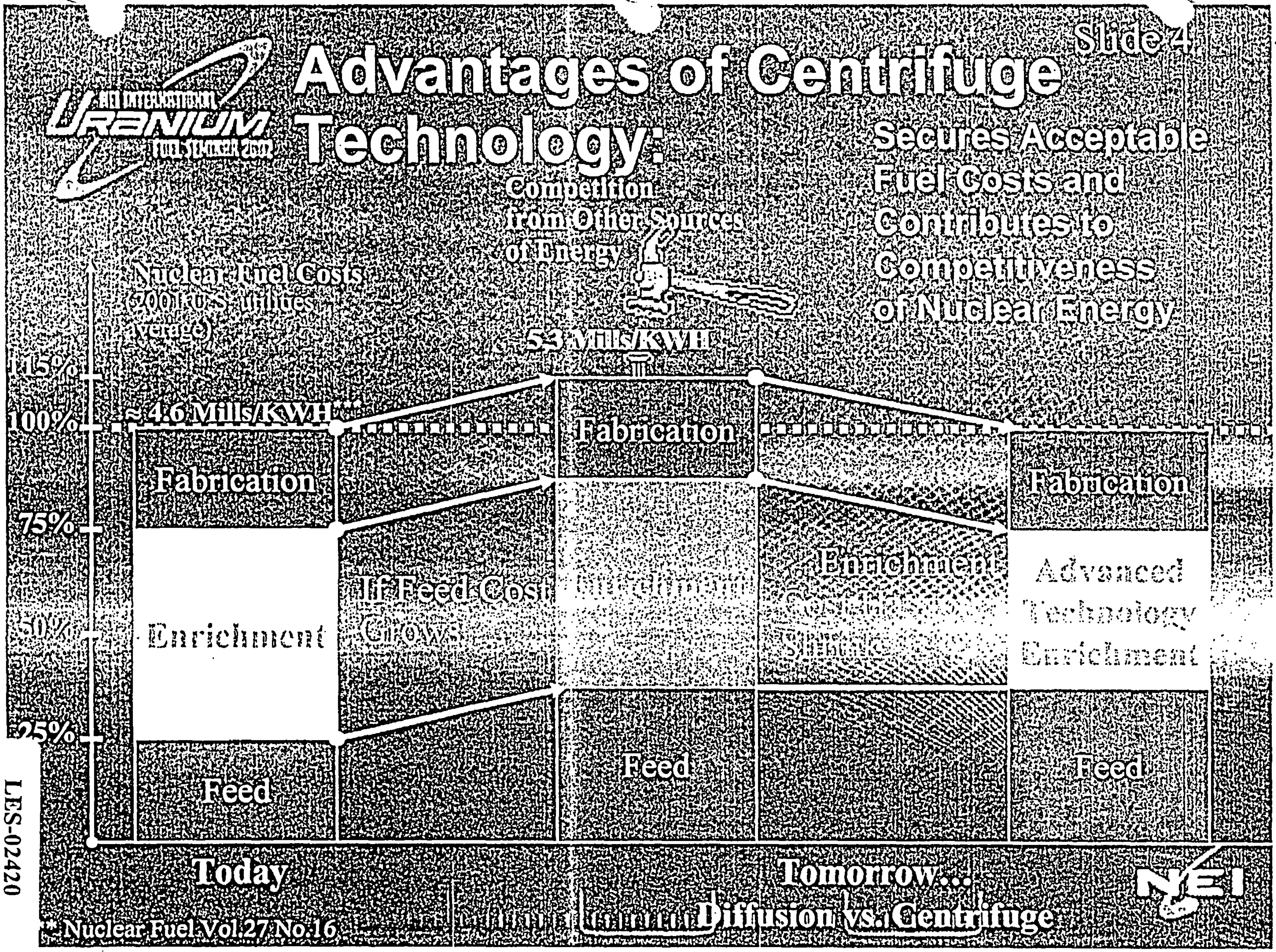

Slide 4
Advantages of Centrifuge Technology:
Secures Acceptable Fuel Costs and Contributes to Competitiveness of Nuclear Energy
NEI International Uranium Fuel Seminar 2002
Competition from Other Sources of Energy
Nuclear Fuel Costs (2001 U.S. utilities average)
5.3 Mills/KWH
115%
100%
≈ 4.6 Mills/KWH**
75%
50%
25%
Fabrication
Enrichment
Feed
If Feed Cost Grows
Fabrication
Feed
Enrichment
Fabrication
Advanced Technology Enrichment
Feed
Today
Tomorrow...
Diffusion vs. Centrifuge
** Nuclear Fuel Vol.27 No.16
NEI

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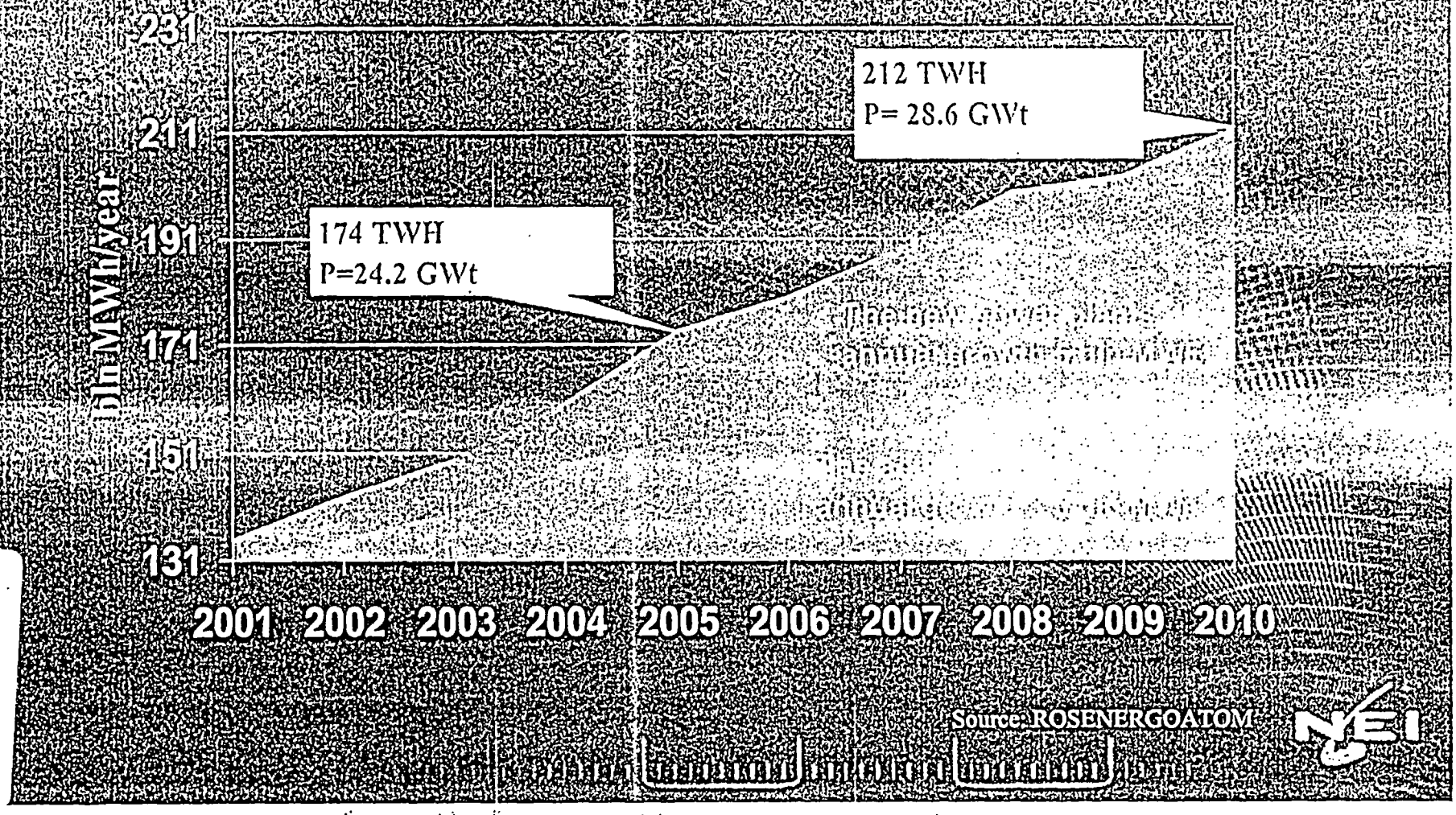
The Planned Growth of Russian Nuclear Energy



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Coexistence of HEU and Commercial Russian SWU on the U.S. Market