

and an expression of support for AAR. Medvedev also issued an order for all members of government to relinquish their positions on the boards of state-controlled companies, and Sechin was the first to be affected when he was forced to step down from the board of Rosneft.

There are also other connections between AAR and Medvedev. One of the businessmen behind AAR, Viktor Vekselberg, is President of the Skolkovo Innovation Centre, which is one of Medvedev's main modernization projects. Perhaps most importantly of all, Medvedev has been the main political actor in favour of a new large-scale wave of privatization, which fits neatly with

his modernization agenda, and might also be of great interest to the businessmen behind AAR. And to them it may be privatization that matters more than the declining political influence of Medvedev. One possibility is thus that Medvedev does not become Prime Minister, but is the fall guy for the failure of United Russia in the December 2011 parliamentary elections. Then somebody like former Finance Minister Kudrin could take over as prime minister once Putin becomes president in March. Who gets the job ultimately may be immaterial to AAR, as long as modernization continues, in the form of privatization.

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#### *Suggested reading*

- Medvedev, Dmitriy (2009) 'Go, Russia!'. Published 10 September. Available at: [http://eng.kremlin.ru/speeches/2009/09/10/1534\\_type104017\\_221527.shtml](http://eng.kremlin.ru/speeches/2009/09/10/1534_type104017_221527.shtml), accessed 11 November 2011.
- Overland, Indra; Lars Lunden; Daniel Fjaertoft and Jakub Godzimirski (forthcoming 2012) 'Open for Business? Rosneft's Offshore Surge'.
- Overland, Indra (2010) 'Close Encounters: Russian Policymaking and International Oil Companies', in Julie Wilhelmsen and Elana Rowe (eds) *Russia's Encounter with Globalization: Actors, Processes and Critical Moments*, Basingstoke: Palgrave Macmillan, pp. 134–158.
- Sakwa, Richard (2010) 'The Dual State in Russia'. *Post-Soviet Affairs*, 26 (3).
- Scott, James C (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press: New Haven and London.

## ANALYSIS

### State-led Modernization in Russia: The Nanotechnology Industry

By Richard Connolly, Birmingham

#### **Abstract**

Since 2007, the development of a competitive nanotechnology industry has been identified as an issue of considerable importance by the Russian government. As part of wider efforts to promote economic modernization in Russia, the government has committed significant resources to support an active industrial policy to help achieve this goal, making Russia one of the world's largest state spenders on the nanotechnology industry. However, Russia's location, far behind the global technological frontier, has hampered state efforts to ignite a wave of activity in this industry, suggesting that state efforts to create high-technology, knowledge-based industries might be inappropriate for a country at Russia's stage of economic development.

#### **Nanotechnology and Economic Modernization in Russia**

Nanotechnology is, according to the International Organisation for Standardisation's definition, 'the understanding and control of matter and processes

at the nanoscale, typically, but not exclusively, below 100 nanometers<sup>1</sup> in one or more dimensions where the onset of size dependent phenomena usually enables novel

<sup>1</sup> A nanometer is one billionth of a meter.

applications'. Nanotechnology is, along with biotechnology and emerging web technologies, classed as an 'emerging technology', i.e., a technology which has 'the potential to create a new industry or transform an existing one, to provide investment opportunities, and to change the world in terms of offering new benefits, and transforming standards of living'.<sup>2</sup>

Nanotechnology is commonly considered to offer considerable promise extending across a wide range of applications, from business opportunities in a number of industries to broader socio-economic benefits globally. Nanotechnology has the potential to change almost every type of manufacturing process and product, across industries as diverse as electronics and engineering, chemicals, health care and pharmaceuticals, pulp and paper, textiles and construction to defence, energy and water. Nanotechnology is also seen as possessing the potential to help address some of the most pressing global challenges, such as those related to energy constraints, climate change, affordable health care and global access to clean water.

Because nanotechnology has such potential across a large number of areas, all significant economic powers—from the rich OECD economies, to large low- and middle-income economies, such as China and India—have expressed a desire to become world leaders in the industry. Russia, in this respect, is no different. Since 2007, considerable public resources have been allocated to help Russia become a prominent player in the global nanotechnology industry. In Russia, however, the development of a world-class nanotechnology industry has been assigned perhaps even greater importance relative to efforts in other countries. After the formulation of a comprehensive industrial policy in 2007 to create a competitive nanotechnology industry, Russia quickly became the world's second largest public spender on nanotechnology-related activities by 2009.

Prominent politicians, including Vladimir Putin and Dmitri Medvedev, have stressed the importance of achieving the goals formulated by the government in this area. That nanotechnology has been elevated to such a level is due to the desire among important Russian policy makers to effect a wider modernization of the Russian economy. The military application of nanotechnologies, with its potential to reinvigorate the ailing microelectronics industry, is also an important factor in explaining the priority assigned to this industry by the leadership. It is, however, the desire for economic

modernization which makes the success or otherwise of industrial policy in the nanotechnology industry of crucial importance to the Russian government: representative as it is of other government initiatives to promote economic modernization, the performance of industrial policy in this area can be considered as a useful indicator of whether the present state-led development agenda is likely to prove successful.

### Industrial Policy in Russia's Nanotechnology Industry

The Russian government took its first significant steps in the sphere of nanotechnology in 2004, when nanotechnology was included as an item in the Federal Targeted Programme on Science and Technology and allocated some 4 billion rubles (approximately \$130 million) for the years 2005 and 2006. Federal Targeted Programmes (FTP) are among the main instruments for implementing government policy in the long-term development of Russia's economy and society. These early efforts were soon eclipsed by the formulation of the strategy for the development of nanoindustries in April 2007. The strategy was to be realised through a series of FTPs, among which was one specifically dedicated to the development of nanotechnology and the creation of new government bodies.

The most important aspects of this strategy were the creation of a governmental supervisory council, as well as of a state corporation for nanotechnology (at the time named *Rosnanotekh*). In late December 2007, the government also approved a Programme for the Development of the Russian Nanoindustry. Significant funds were assigned to this task: over 100 billion rubles (approximately \$3.3 billion) was envisaged to fund the various elements of the strategy up to 2015. The magnitude of resources allocated was a reflection both of the importance nanotechnology had acquired in policy-making circles, and also of the poor state of Russia's nanotechnology industry at this point. In particular, the earlier FTP had identified a large gap between the need for high quality research and development and the critically low level of infrastructure development in the nanotechnology industry. While such a gap existed, the prospects for the development of a vibrant nanotechnology industry in Russia appeared bleak.

The size of the resources allocated to the 2007 strategy led to the formulation of several ambitious objectives. First, it was hoped that annual sales of Russian nanoindustry products would more than double, with an increase from around \$0.7 bn in 2008 to \$1.5 bn in 2015. Second, the Russian share of the global nanoindustry market was targeted to grow from 0.07 per cent in 2008 to 3 per cent in 2015. Finally, annual nanoindustry exports were expected to reach a level of \$6.43

2 Narayanan, V.K., and O'Conner, G., (2010) 'What are Emerging Technologies?' in Narayanan, V.K., and O'Conner, G. (eds.) *Encyclopedia of Technology and Innovation Management*, John Wiley & Sons.

bn in 2015, from a meagre level of \$0.14 bn in 2008. Considering the relatively low level of Russia's nanoindustry in 2007, these were lofty ambitions. In order to achieve these ambitions, the overall strategy comprised three main policy instruments. First, a governmental supervisory board was created, tasked with coordinating the efforts of Federal organisations. Second, a much enhanced Development Programme for Nanoindustry was formulated. Third, and arguably most notably, the Russian Nanotechnologies Corporation—known more commonly at the time as Rusnanotekh, but now as Rosnano—was created in July 2007.

### **The Supervisory Council for Nanoindustry Development**

Overall coordination of Federal bodies and other organisations involved in the nanoindustry was initially conducted by the Supervisory Council for Nanoindustry Development, consisting of a number of ministers, heads of government agencies and services, and deputies from the State Duma and Federation Council, as well as representatives from industry. The Supervisory Council was, however, later superseded by the Government Commission on High Technology and Innovations, to which many of the members of the Supervisory Council were appointed. The Commission has a broader remit than the Supervisory Council for Nanoindustry Development, and is charged with developing other high-technology industries and not just nanotechnology. The Commission is currently chaired by Vladimir Putin, and includes individuals associated most directly with nanotechnology, such as Andrei Fursenko, the Minister of Science of Education, Mikhail Kovalchuk, the director of the Kurchatov Institute, and Anatolii Chubais, Director General (functional equivalent of CEO) of Rosnano. The prominent role assigned to Chubais—the individual with a reputation as perhaps the most effective 'modernizer' within the elite—reflects the importance of nanotechnology to the leadership.

### **The Development Programme for Russian Nanoindustries**

The Ministry for Science and Education formulated the Development Programme for the Russian Nanoindustry to 2015, which was approved by the government in December 2007. Under the supervision of Sergei Ivanov, the overall objective of the Development Programme was nothing less than the creation of internationally competitive research and development (R&D) capacities in the sphere of nanotechnology by 2011. Achieving this objective would, if successful, lay the foundations for the commercialisation of nanotechnology

products after 2011 in order to meet the ambitious targets outlined above.

The Development Programme identified four main tasks: to create a functioning and internationally competitive infrastructure for the nanoindustry; to develop efficient mechanisms for providing competent personnel; to create an infrastructure for harmonisation and standardisation; and, finally, to develop mechanisms for the commercialisation of the scientific results of domestic R&D. All are what economists would describe as 'supply-side' measures, i.e., efforts to improve Russia's capacity to supply nanotechnology. The Programme included a number of quantitative indicators against which progress in achieving these aims could be gauged. These included targets on the quality of equipment used in the industry, the age and qualifications of researchers, and the number of research articles published in international scientific journals.

The Development Programme was allocated a total budget of over 100 billion rubles (\$3.3 billion), of which more than two-thirds was assigned to R&D. Around 30 billion rubles (\$1 billion) was intended for building a nanoindustry infrastructure, and was almost entirely channelled through the FTP for the Development of a Nanoindustry Infrastructure in the years 2008–2010 mentioned above. The size of the Development Programme budget was, and remains by international standards, extremely impressive. However, Russia has failed to meet the objective of developing an internationally competitive R&D sector for nanotechnology by 2011. This is primarily due to the shortage of human capital and the failure to build significant nanoindustry research infrastructure capacity. Both issues are likely to act as significant obstacles to the planned development of a world-leading nanotechnology industry in Russia.

### **Rosnano**

Created in July 2007, Rosnano (originally Rusnanotekh) was one of several state corporations which were intended to spearhead the economic modernization that was envisaged in the Concept for the Long-Term Socio-Economic Development of the Russian Federation (Strategiya 2020). Rosnano was intended to act as the primary organisation in the execution of state policy in the sphere of nanotechnology more generally, and also in developing the wider nanotechnology infrastructure in conjunction with the FTP described above. Primarily, it was tasked with implementing projects designed to establish a viable long-term nanotechnology industry. As a state corporation, Rosnano was exempted from the ordinary means of control of non-commercial state organisations and was also exempted from ordinary bankruptcy laws.

The main tasks defined in its strategy to 2020 were the commercialisation of nano-industry products and the coordination of innovation activity in the nanoindustry sphere. Because private sector activity in the nanoindustry was, and still is, so limited, Rosnano's remit effectively covered the creation of an entire industry from almost nothing. To do this, Rosnano is involved in a wide range of activities. These activities include: foresight and roadmapping exercises; co-financing of scientific and engineering infrastructure programmes, as well as industrial parks, technology transfer centres, special economic zones and business incubators; the financing of R&D projects based on projects' commercialisation prospects; the development of a substantial intellectual property (IP) portfolio; supporting educational projects dedicated to training specialists required for all stages of the innovation pipeline; efforts to improve the business environment for the nanoindustry; certification and standardisation activities; the promotion of nanoduct safety standards and cooperation with international bodies; raising public—domestic and foreign—awareness of the importance of nanotechnology; and the collation of nanotechnology-related information in Russia; and through international co-operation, based on agreements and cooperative efforts to facilitate the Russian nanoindustry's presence on the international scene.

In March 2011, President Medvedev signed a decree that reorganised Rosnano so that it became a Joint Stock Company. Although 100 per cent of shares in Rosnano are currently owned by the state, a gradual privatisation is envisaged. Ostensibly, this reorganisation was intended to increase transparency. In practical terms, it means that there are now two entities that are of importance to the nanotechnology industry in Russia: Rosnano, a commercial entity tasked with focusing on business projects; and the Fund for Infrastructure and Educational Programmes, a non-commercial entity charged with coordinating: infrastructure projects and programmes; foresight and road mapping activities; standardisation, certification, and metrology; education and popularisation; and organising the Nanotechnology International Forum.

The most important instrument for achieving the tasks envisaged in the long-term strategy is the considerable sum of money allocated to the co-financing of nanoindustry projects. In late 2007, RosNano reported that the company planned to make investments totalling 217.5 billion rubles (\$7.1 billion) over the period 2008–2015, although by 2011 this was revised up to around 300 billion rubles (\$10 billion). Of this, 34 billion rubles was to come from sales revenues and 53.5 billion rubles from investments from extra-budgetary sources. Of the 130 billion rubles government investment, some 70 per

cent was dedicated to developing nanoindustry production and creating a market for nanoproducts.

The number of nanotechnology projects initiated by the summer of 2011 was still rather small. Less than a hundred applications had been granted co-financing by the Supervisory Board. Of these, most were related to nanotechnology production and around a dozen were infrastructure projects. Even though infrastructure projects are small in number, they do in fact account for a disproportionate share of allocated funds (around a quarter). This is consistent with the priority assigned by policy makers to the creation of nanoindustry infrastructure. Optoelectronics and nanoelectronics account for the largest share of financing. This reflects the fact that this is the area in which Russian companies were strongest prior to the development of state industrial policy. The fact that the largest share of financing is going to the best established sub-field in Russia should be no surprise; investment funds are likely to flow to where existing capacity is found because this is where sufficient infrastructure and human capital are already present. It is clear that, until the wider efforts to improve the supply of infrastructure and human capital begin to register a significant effect, the growth of new sub-fields is likely to be slow.

### **Is the Promotion of Nanotechnology in Russia Likely to Succeed?**

While state efforts to develop the nanoindustry in Russia have been, at least in material terms, impressive, there remains much work to be done. There are strengths on which to build. Russia appears relatively strong in theoretical research: it ranked eighth in nanotechnology publications between 1991–2007, behind China and Korea, but ahead of Italy and Switzerland. Public spending on nanotechnology research is currently among the highest in the world. A small but dynamic private sector exists: for example, NT-MDT, which specialises in scanning probe microscopes, is ranked second in terms of sales volumes on the world market. The firm reinvests c. 15–20 per cent of revenues in R&D and has forged a number of associations with foreign companies. In terms of regional distribution, some regions are especially active, with most nanotechnology activity concentrated in Central and North West okrugs (Moscow, St Petersburg, Tomsk, Kaluga, Perm).

However, the weaknesses remain severe. Russia performs badly in the commercialisation of research, ranking 16th in world in number of patents related to nanotechnology—behind Korea and China, a meagre 0.2 per cent of the global total. The industry is overwhelmingly state dominated, with over 80 per cent of all investment in nanotech-related activities in Russia subsidised to



some degree by the state. The acceleration of state investment since 2007 means that this tendency is unlikely to be reversed. Of particular importance is the fact that nanoscience infrastructure is—compared to the EU, USA and Japan, at least—extremely underdeveloped. While this remains the case, it is difficult to see Russia making any significant strides as a major nanotechnology actor. This manifests itself in the relatively small number of R&D personnel in fields of nanotechnology and nanoscience: c. 14,500 in 2009 (3.9 per cent of all researchers) compared to c. 150,000 in the USA in 2008.

There are also a number of weaknesses in the specific mix of policies designed to stimulate activity in the nanotechnology industry.

First, it is not clear that the efforts made so far will result in a significant expansion of private sector activity in the Russian nanotechnology industry. The co-financing element of Rosnano's activity—arguably the primary feature of Russia's industrial policy—means that any company will, to some degree, experience partial state ownership. While the state share does not, in most cases, exceed 49 per cent, it is certainly true that Rosnano—a state agency—makes the key decisions on lending. Moreover, it is not clear what role the state will play in those ventures that have been co-financed by Rosnano. The company claims that after 3–5 years, the state will relinquish its share in the co-financed projects. However, it is not clear that Rosnano will be able to relinquish its stake in unsuccessful ventures. If there are no buyers, will the state be prepared to make significant losses? In short, a clear mechanism for 'letting losers go' is required if the policy is not to turn into an open-ended rent-seeking arrangement.

Second, the wider, non-Rosnano related private sector will also need to grow if current policies are to be considered successful. However, while private sector investment in nanotechnology surpasses government financing in most other countries, the opposite is true in Russia. This resulted in a less privileged position for Russia when its total funding for nanotechnology development was compared with that of other countries. In 2010, there were few private investors in Russia, and foreign capital had shown little interest in high-tech industries such as nanotechnology, presumably due to the poor climate for long-term investment. Investors from developed countries are able to bring important capital to Russia, as well as ideas about corporate management, governance, and reporting and accounting standards—not to mention the fact that joint ventures are perhaps the most effective way of achieving technology transfer. While foreign activity remains subdued, the prospects for private sector development in nanotechnology appear especially bleak.

Third, there is only a muted demand for nanotechnology products in the Russian economy. This low demand is generally correlated with wider high-technology production levels. In Russia, high-tech products account for a small proportion of production and exports, so it should be no surprise that demand for nanotechnology products is correspondingly low. Without significant levels of sustained demand for these products, it is highly unlikely that supply—in the form of production facilities that allow high volume serial production of quality micro-components—will expand. If this continues to be the case the ambitious targets outlined in the 2007 strategy are unlikely to be achieved.

### Implications for Economic Modernization

A wider issue—and perhaps the most important one—is whether the sort of industrial policy typified by efforts in the field of nanotechnology is really appropriate for a country like Russia. Russia's level of per capita income relative to the USA and the EU shows that Russia is located some way behind the global 'technological frontier'. Put simply, there are two routes to increasing productivity growth in an economy (economic modernization, in other words). The first is through innovation; the second is through imitation. The choice of which broad strategy is adopted should largely be a function of a country's position in relation to the technological frontier.

Broadly speaking, if a country is, like Russia, located some way behind the frontier, its mix of policies to promote economic modernization should include efforts to upgrade technologically through cooperation with foreign companies (through inward foreign direct investment [FDI], for example) and the import of embodied technology. The effective acquisition, absorption and diffusion of foreign technology require policies designed to enhance the absorptive capacity of an economy. Public policy should, for example, focus on attracting FDI and then embedding these actors within Russia's domestic economy by integrating FDI and stimulating multiple linkages between foreign and domestic firms. This type of process would be a slower and less grandiose path to modernization; it would also be much more likely to achieve significant results.

However, Russian state policies appear intent on building industries that, like nanotechnology, are by and large close to, or at, the technological frontier. Success in these industries requires the institutional conditions which will permit innovative development. Such conditions include: flexible labour markets, nimble financial systems, high levels of competition, and a high quality of tertiary education, and a well-functioning public administration. On all dimensions, Russia does not score highly in any of the seemingly ubiquitous inter-

national rankings compiled by the likes of the World Economic Forum and the World Bank. With this in mind, Russian efforts appear almost entirely inappropriate for the task in hand.

Ultimately, then, despite the promise of significant resources being allocated to the likes of energy efficient technology, nuclear technology, space technology and communication, pharmaceuticals, and strategic infor-

mation technology, the fact that Russian industrial policies are not appropriate for the domestic context means that modernization Putin-style is quite unlikely to result in anything other than, at best, the development of small 'enclaves' of innovation, weakly linked to the wider Russian economy, and too small to generate wide-scale economic modernization.

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## ANALYSIS

### Raiding in Russia

By Richard Sakwa, Kent

#### **Abstract**

Raiding has become one of the characteristic features of Russia in the twenty-first century. Raiders rely on their positions of authority and typically act with government approval, and often in concert with governmental authorities, to exert an improper influence on the prosecution process, in particular with the courts and the police. Applying the model of the dual state, this article notes the salience of instances of 'reiderstvo' from Yukos to Hermitage Capital. The political orders associated with the constitutional and prerogative states are locked in a stalemate. Meta-corruption operates in an economy of rents and political factionalism and is beginning to create a distinct order of its own. The entwining of political and criminal activities damages government, the courts and the investment climate and impedes modernisation.

Two political orders are locked in a stalemate in contemporary Russia: the constitutional state based on the rule of law and institutionalised processes, and the prerogative state operating outside of the constitutional constraints to which it is formally committed. This 'prerogative state', or as we call it, the administrative regime (*Verwaltungsstaat*), represents a distinctive case of 'domain democracy', where the rules applied to the rest of society do not apply to itself. The tension between these two principles of governance characterises Russian politics. Each of the two orders has its own logic and supporters, but the systemic paralysis provoked by the tension between these two pillars generates legal nihilism and opportunistic rent-seeking by officials, law-enforcement agents and economic actors and has allowed the consolidation of a third force.

#### **Meta-corruption**

Raiding (known as *reiderstvo* in Russian) has become not only an economic phenomenon, but also something permeating social life. The term is used to describe all sorts of attacks by one agency against another. For example, when in September 2011 Father Vsevolod Chaplin, the head of the public relations department of the Moscow patriarchate, called for women to observe a modest 'dress code', this provoked a furious reaction and a court case against a journalist who condemned the church's intervention in daily life. The journalist, Boris Obratsov, was accused of 'extremism', applying Article 282 of the Russian Criminal Code which provides a wide range of reasons to prosecute dissent, and the whole episode was called 'raiders in cassocks'.<sup>1</sup>

1 Aleksandr Kukolevskii, "Reideram v ryasakh" naznachili tsenu', *Kommersant-Vlast*, No. 38, 26 September 2011.