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THE FIRST GERMAN-RUSSIAN WEEK OF THE YOUNG RESEARCHER

September 19-24, 2011

DWIH DEUTSCHES WISSENSCHAFTS- UND INNOVATIONSHAUS MOSKAU

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Российско-Германский год образования, науки и инноваций 2011/12

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THE FIRST GERMAN-RUSSIAN WEEK
OF THE YOUNG RESEARCHER

MAN AND ENERGY

Kazan, September 19-24, 2011

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Dear Colleagues from Russia and Germany,

welcome to the first "Week of the Young Researcher"!

Dr. Gregor Berghorn

Dr. Jörn Achterberg

Some time ago the idea was born to invite young researchers from Germany and Russia to come together and to discuss current topics of mutual interest. Our main goal this week is to foster cooperation among the young scientists and researchers from both our countries who not so long from now will be setting the course of scientific cooperation between Russia and Germany, indeed, if we may say so, between Russia and Europe!

Research organizations and institutions of higher education of both our countries will this week introduce their programmes and showcase the platforms that they can offer, to Russian and German PhD students and PostDocs who wish to initiate collaborative projects or broader research networks.

We have chosen the University of Kazan as the venue for the conference with good reason, for Kazan is historically seen as one of the first of the Russian universities. And indeed Kazan has itself been influenced by a number of renowned "Young Researchers" and "Privatdozenten" hailing from Germany. Thus Kazan and its University, an outstanding example of its kind in Russia, is strongly symbolic of German-Russian cooperation in the field of science and research.

We would like to express our gratitude to the Federal University of Kazan for its academic hospitality, to the Ministry of Education and Science of Tatarstan for its support, as well as to the Council of the Russian Union of Young Scientists (ROSMU) and its Chairman Dr. Aleksandr Shcheglov. And of course we thank all of you, the participants, for their involvement in this conference.

СПАСИБО ВАМ!

Dr. Gregor Berghorn

German Academic Exchange Service
Head of DAAD Office Moscow
Managing Director of DWIH Moscow

DAAD

Dr. Jörn Achterberg

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Rustam Nurgaliewitsch Minnichanow
Präsident der Republik Tatarstan

Рустам Нургалиевич Минниханов
Президент Республики Татарстан

Дорогие читатели!

С 19-го по 24 сентября 2011 года в Казанском федеральном университете прошла первая российско-германская «Неделя молодого ученого». Более 40 молодых ученых из Германии и России и 10 известных ученых и вузовских преподавателей, представляющих различные области науки, смогли обменяться опытом и знаниями по теме «Человек и энергия». Мы все знаем, насколько это важно для обеих стран в будущем.

Как президент Республики Татарстан я очень рад, что для проведения конференции ее организаторы выбрали именно Казань. Конечно, Казань имеет большое историческое значение для России и Европы, здесь находится один из старейших университетов России. Это город будущего, здесь экономика и наука объединились для достижения новой общей цели. За счет внедрения инноваций, модернизации и создания новых структур стимулируется развитие Республики Татарстан, происходит укрепление предприятий, повышается экономический потенциал в этом регионе, развиваются промышленность и сельское хозяйство. В России ощущается потребность в экономическом росте, а для роста, в свою очередь, необходимы материальные, финансовые и интеллектуальные ресурсы. Я горжусь тем, что такие ресурсы есть в нашей республике. Однако мы осознаем необходимость и дальше развивать этот капитал.

В первую очередь это касается основного капитала – человеческого. Человеческий фактор является решающим, ведь, в конце концов, именно человек принимает решения, разрабатывает и продвигает вперед идеи. Высокое качество жизни, поддержка системы образования и науки гарантируют долгосрочный прогресс в обществе и в нашей республике.

Уже сейчас играет ключевую роль и еще заметнее будет играть в будущем взаимодействие с другими государствами в политической, экономической, сельскохозяйственной и прежде всего научной сферах. И здесь Казань, да и вся наша республика в целом, славятся своей открытостью. В 2013 году в Казани пройдет Универсиада, на которую соберутся молодые люди со всего мира. Татарстан – республика молодежи, молодым людям и их способностям мы доверяем созидание будущего.
Поэтому я горячо приветствую идею собрать здесь молодых людей из Германии и России и предоставить им возможность обсудить важные для всех нас перспективы будущего.
Хочу поблагодарить немецкую сторону за ее инициативу провести «Неделю молодого ученого» и за выбор Казани местом проведения мероприятия. Выражаю благодарность Федеральному университету и всем, кто был задействован в организации этого мероприятия.

Бик зур рахмат!

Liebe Leserinnen und Leser,

vom 19. bis 24. September 2011 war die Föderale Universität Kasan die Gastgeberin für die „1. Deutsch-Russische Woche des jungen Wissenschaftlers". Insgesamt über vierzig junge deutsche und russische Wissenschaftler sowie weitere zehn erfahrene Wissenschaftler und Hochschullehrer aus unterschiedlichen Fächern aus beiden Ländern haben zum Thema „Mensch und Energie" ihre Gedanken und wissenschaftliche Erkenntnisse ausgetauscht. Wir alle wissen, wie bedeutsam dieses Thema für unsere beiden Länder in Zukunft werden wird.

Als Präsident der Republik Tatarstan freue ich mich, dass die Wahl des Konferenzortes auf Kasan gefallen ist. Natürlich ist Kasan eine Stadt mit historischer Bedeutung für Russland und Europa, sie ist auch Standort einer der ältesten Hochschulen Russlands. Sie ist inzwischen vor allem aber auch eine Stadt des Aufbruchs in eine Zukunft, in der sich Wirtschaft und Wissenschaft zu einem neuen gemeinsamen Ziel verbinden. Denn durch die Schaffung von Innovationen, durch Modernisierung und neue Strukturen soll die Republik Tatarstan gefördert werden, sollen die Unternehmen dieser Region gestärkt werden, soll das Leistungsniveau der Wirtschaft, der Industrie und der Landwirtschaft erhöht werden. Russland braucht wirtschaftliches Wachstum, aber das setzt wiederum Ressourcen voraus, und zwar materielle, finanzielle und intellektuelle. Ich bin stolz darauf, zu wissen, dass wir in unserer Republik über diese Ressourcen verfügen. Wir sind uns aber auch bewusst, dieses Kapital weiterzuentwickeln.

Das gilt in besonderer Weise für das wichtigste Kapital, das wir haben, das menschliche. Gerade die sogenannten Humanressourcen sind entscheidend, denn letztlich sind es immer die Menschen selbst, die etwas entwickeln, entscheiden und voranbringen. Gute Lebensbedingungen, Pflege der Bildung und Wissenschaft sowie günstige wirtschaftliche und rechtliche Rahmenbedingungen sind die langfristigen Garanten des Fortschritts für unsere Gesellschaft und unsere Republik.

Bereits jetzt – und noch viel mehr in der Zukunft – werden die Beziehungen zu anderen Ländern und Staaten in den Bereichen Politik, Wirtschaft, Landwirtschaft und vor allem Wissenschaft eine entscheidende Rolle einnehmen. Auch hier genießen Kasan und unsere Republik den Ruf großer Weltoffenheit. 2013 wird Kasan Austragungsort der Universiade sein, wo wir wieder zahlreiche junge Leute aus aller Welt begrüßen werden.
Tatarstan ist eine Republik der jungen Menschen, wir vertrauen der Jugend und ihren Fähigkeiten, die Zukunft zu gestalten.
Wir begrüßen daher die Idee, dass junge Leute aus Deutschland und Russland sich zusammenfinden und über für sie wichtige gemeinsame Zukunftsperspektiven sprechen.
Ich danke daher der deutschen Seite für ihre Initiative zu dieser Woche des jungen Wissenschaftlers und für die Entscheidung, hierfür Kasan gewählt zu haben.
Der Föderalen Universität sowie allen, die an der Gestaltung der Woche mitgewirkt haben, spreche ich meinen Dank aus.

Bik zur rakhmat!

Albert Harisowitsch Gilmutdinow
Minister für Bildung und Wissenschaft
der Republik Tatarstan

Альберт Харисович Гильмутдинов
Министр образования и науки
Республики Татарстан

Уважаемые дамы и господа!

Российско-германские научные связи имеют давнюю традицию. Со времен Петра I и еще более интенсивно со времени правления Екатерины Великой русские студенты уезжали на учебу в Германию, а немецкие профессора, преподаватели и ученые, наоборот, приезжали в Россию. В значительной мере это касается и Казанского университета, где с момента его основания в начале XIX в. среди преподавателей числились известные ученые из Германии. На протяжении своего существования Казанский университет передавал другим российским и европейским университетам основательные научные импульсы в таких областях как медицина, математика, химия, а также в гуманитарных науках и юриспруденции. Казанский университет оказал существенное влияние на развитие России, а его местоположение на Волге, разделявшей по тем представлениям Европу и Азию, определяло его функцию посредника между Востоком и Западом.

Учитывая традиционную научно-культурную роль Казани и отдавая должное ее современному научному профилю, представленные в России немецкие научные организации решили именно здесь провести первую российско-германскую «Неделю молодого ученого». Предпосылки к такому решению очевидны: здесь сложился дифференцированный вузовский ландшафт во главе с Федеральным университетом и Национальными исследовательскими университетами, кроме того, здесь расположены исследовательские институты РАН и Академии наук Республики Татарстан. Университеты, вузы и исследовательские институты активно поддерживают международное сотрудничество и участвуют в научных проектах, при этом на первый план выходят российско-германские отношения: десять казанских вузов имеют договоры о партнерстве с немецкими вузами. Здесь представлен широкий спектр концепций развития экономики, образования и прежде всего квалификации специалистов.

С помощью двух программ, реализуемых совместно с Германской службой академических обменов (DAAD), Республика Татарстан поддерживает молодых специалистов, руководителей (программа «Николай Лобачевский») и ученых (программа «Евгений Завойский»). Таким образом осуществляется поддержка и модернизация достижений национальной экономики и качества вузовского образования.

Во всем мире признаны заслуги казанских ученых в области химии, биотехнологий и в науках о жизни. Тема нынешней конференции – взаимоотношения человека и энергии – будет неотступно сопровождать нас в дальнейшем. На сегодняшний день приоритетными являются вопросы энергоснабжения, управления энергией и ее эффективного использования. Тема конференции чрезвычайно актуальна, и мы очень рады, что в ее обсуждении в Федеральном университете примут участие российские и германские молодые ученые разных областей научных знаний. Особенно радует, что российские участники представят всю широкую географию России: от Абакана до Калининграда, от Архангельска на севере до Нальчика на юге. Тем самым Казань выполняет свою давнюю функцию посредника между Европой и Азией.

Я надеюсь, что в ходе мероприятия у вас сложится интересная беседа, а немецким участникам желаю хороших воспоминаний о Казани и Татарстане.

Sehr geehrte Damen und Herren,

die wissenschaftlichen Beziehungen zwischen Deutschland und Russland blicken auf eine lange Tradition zurück. Seit Peter dem Großen, vor allem aber seit Katharina der Großen sind viele junge Russen zum Studium nach Deutschland gefahren und sind umgekehrt viele deutsche Professoren, Hochschullehrer und Wissenschaftler nach Russland gekommen. Das gilt in herausragender Weise für die Universität Kasan, die gerade zu Beginn ihrer Tätigkeit Anfang des 19. Jahrhunderts berühmte deutsche Wissenschaftler unter ihren Professoren hatte. Die Universität hat im Laufe der Zeit ihrerseits nachhaltige wissenschaftliche Impulse an andere russische und europäische Universitäten vermittelt, auf den Gebieten der Medizin, der Mathematik, der Chemie, aber auch in den Geistes- und Rechtswissenschaften. Die Universität Kasan hat ganz wesentlich zur Entwicklung Russlands beigetragen, und ihre Lage an der Wolga, der früheren Grenze zwischen Europa und Asien, sollte auch ihre Mittlerfunktion zwischen West und Ost zum Ausdruck bringen.

Vor dem Hintergrund dieser traditionellen wissenschaftlich-kulturellen Funktion der Stadt Kasan, aber auch in Würdigung des wissenschaftlichen Profils des modernen Kasans haben sich die in Russland vertretenen deutschen Wissenschaftsorganisationen dazu entschlossen, die „1. Deutsch-Russische Woche des Jungen Wissenschaftlers“ in Kasan durchzuführen. Die Voraussetzungen hierfür sind deutlich und klar: Es besteht eine differenzierte Hochschullandschaft mit der Föderalen Universität und der Nationalen Forschungsuniversität an der Spitze, mit dem regionalen Zentrum der Russischen Akademie der Wissenschaften und dem Sitz der Akademie der Wissenschaften der Republik Tatarstan. Die Universitäten, Hochschulen und Akademieinstitute sind in internationale Kooperationen und Wissenschaftsprojekte eingebunden, wobei die Beziehungen mit Deutschland eine führende Position einnehmen, denn es gibt 10 sehr gut arbeitende Hochschulpartnerschaften mit deutschen Hochschulen. Es gibt umfassende Konzepte zur Entwicklung der Wirtschaft, der Bildung und vor allem zur Qualifikation der Fachkräfte.

Mit zwei gemeinsam mit dem Deutschen Akademischen Austauschdienst (DAAD) durchgeführten Programmen fördert die Republik Tatarstan künftige Fach- und Führungskräfte („Nikolai Lobatschewskij“- Programm) und den wissenschaftlichen Nachwuchs der Universitäten der Republik Tatarstan („Jewgenij Sawojskij“-Programm). Auf diese Weise werden die Leistung der einheimischen Wirtschaft und die Ausbildungsqualität an den Hochschulen gestärkt und modernisiert.

In den Bereichen Chemie, Biotechnologie und Life Sciences sind die Leistungen Kasaner Wissenschaftler führend und weltweit anerkannt. Das Thema der Konferenz, die Beziehungen zwischen Mensch und Energie, wird uns in Zukunft ständig begleiten. Fragen der Energieversorgung, des Energiemanagements und der Energieeffizienz gehören zu den prioritären Gebieten für unseren Staat. Insofern ist das Konferenzthema hochaktuell und wir begrüßen es daher außerordentlich, dass es an der Föderalen Universität unter Beteiligung junger deutscher und russischer Wissenschaftler aus unterschiedlichen Fachrichtungen diskutiert wird. Besonders freut uns, dass die russischen Teilnehmer die geographische Weite Russlands repräsentieren. Von Abakan bis Kaliningrad, von Archangelsk im Norden bis Naltschik im Süden sind junge Wissenschaftler vertreten. Und somit erfüllt Kasan auch heute noch seine alte Funktion als Mittler zwischen Europa und Asien.

Ich wünsche eine lebhafte Diskussion und den deutschen Teilnehmern eine nachhaltige Erinnerung an Kasan und Tatarstan.

Photo: Aliya Galimullina

Prof. Dr. Ilschat Gafurov

Rektor der Föderalen Universität Kazan

Проф. д-р Ильшат Гафуров

Ректор Казанского федерального университета

Уважаемый господин Посол! Уважаемые коллеги! Дамы и господа!

Хочу поприветствовать вас здесь, в стенах Казанского университета – одного из старейших высших учебных заведений России! Он получил всемирную известность прежде всего благодаря своим выдающимся научным открытиям, которые явились результатом деятельности научных школ. В их основе лежит традиция исследовательской культуры, передаваемая новым поколениям ученых.

Несомненно, «Неделя молодого ученого» на тему «Человек и энергия», проходящая в нашем городе в рамках Российско-Германского года образования, науки и инноваций, станет серьезным подспорьем в создании новых импульсов роста для университетской науки. Год науки – это уникальная инициатива президента Дмитрия Анатольевича Медведева и федерального канцлера Ангелы Меркель, которая свидетельствует об углублении отношений между нашими странами в области образования, научных исследований и инноваций.

Именно очень тесное и доверительное двустороннее сотрудничество в научно-образовательной сфере, уходящее корнями глубоко в историю, и побудило руководителей наших стран в ходе российско-германских межправительственных переговоров на высшем уровне в Екатеринбурге 14–15 июля 2010 г. договориться о проведении в 2011–2012 годах Российско-Германского года образования, науки и инноваций.
Проведение «Недели молодого ученого» на базе Казанского университета наш коллектив с полным основанием рассматривает как знак признания заслуг вуза в развитии российско-германских научных связей. У этих связей давняя и славная история. Немецкая наука вообще сыграла особую роль в становлении науки в России. Как сказал выдающийся историк Сергей Федорович Платонов, живший на рубеже XIX–XX вв., «если немецкая наука – мать, то русская – её дочь».

Сегодня Казанский университет продолжает активно сотрудничать с немецкими научно-образовательными центрами на основе взаимовыгодного партнерства. На Германию приходится около трети всех мероприятий по программам обмена для студентов, аспирантов, ученых и преподавателей нашего университета. Это самый высокий показатель среди трех десятков стран, с университетами и исследовательскими центрами которых Казанский университет имеет партнерские отношения. А более чем 20-летнее партнерство КФУ с Гиссенским университетом Германская служба академических обменов признала образцом двусторонних связей между научно-образовательными центрами.

Казанский форум молодых ученых как нельзя лучше отвечает замыслу Российско-Германского года науки, поскольку объединяет два важнейших направления: передовые исследования под девизом «Партнерство идей» и поддержку молодых ученых.

Я уверен, что «Неделя молодого ученого» станет хорошей основой для стартующего в 2012 г. перекрестного Года Германии в России, в мероприятиях которого наш университет готов принять самое деятельное участие.

Sehr geehrter Herr Botschafter, sehr geehrte Kolleginnen und Kollegen, meine Damen und Herren,

gestatten Sie mir, Sie hier in den Mauern der Universität Kasan, einer der ältesten Bildungseinrichtungen Russlands, begrüßen zu dürfen. Sie hat ihren Weltruf vor allem durch ihre wissenschaftlichen Entdeckungen dank der Tätigkeit ihrer wissenschaftlichen Schulen erlangt. Ihren Grundstein bildet die Tradition der Forschungskultur, die der neuen Generation von Wissenschaftlern weiter vermittelt wird.

Ohne Zweifel stellt die Woche des Jungen Wissenschaftlers zum Thema „Mensch und Energie", die im Rahmen des Deutsch-Russischen Jahres der Bildung, Wissenschaft und Innovation in unserer Stadt stattfindet, eine große Hilfe bei der Schaffung neuer Wachstumsschwerpunkte für die universitären Wissenschaften dar. Dieses Jahr der Wissenschaft ist eine einzigartige Initiative von Präsident Dmitrij Anatoljewitsch Medwedew und Bundeskanzlerin Angela Merkel, die von einer Vertiefung der Beziehungen zwischen unseren Ländern im Bereich Bildung, Forschung und Innovation zeugt.

Gerade die sehr enge und vertrauensvolle bilaterale Zusammenarbeit im Bereich Wissenschaft und Forschung, die tief in der Geschichte verwurzelt ist, regte die Führung unserer Länder während der deutsch – russischen Regierungskonsultationen auf höchster Ebene am 14. und 15. Juli 2010 in Jekaterinburg an, die Durchführung eines Deutsch-Russischen Jahres der Bildung, Wissenschaft und Innovation im Jahr 2011/2012 zu vereinbaren.

Die Durchführung der Woche des jungen Wissenschaftlers an der Universität Kasan wird von uns als Anerkennung des Verdienstes unserer Universität für die Entwicklung der russisch – deutschen Wissenschaftsbeziehungen angesehen. Diese Wissenschaftsbeziehungen können auf eine lange und ruhmreiche Geschichte zurückblicken. Im Ganzen gesehen hat die deutsche Wissenschaft eine besondere Rolle bei der Entstehung der russischen Wissenschaft eingenommen. Der Historiker Sergej Fjodorowitsch Platonow, der an der Schwelle vom 19. zum 20. Jahrhundert und am Anfang des 20. Jahrhunderts gelebt und gewirkt hat, hat gesagt, dass „wenn die deutsche Wissenschaft die Mutter ist, dann ist die russische Wissenschaft ihre Tochter".

Heute setzt die Universität Kasan ihre aktive Zusammenarbeit mit deutschen Forschungszentren auf partnerschaftlicher Grundlage fort. Auf Deutschland entfallen Austauschmaßnahmen für Studenten, Doktoranden, Wissenschaftler und Dozenten unserer Universität. Dieses ist das höchste Austauschvolumen, das die Universität Kasan mit über 30 ausländischen Partneruniversitäten durchführt. Und die mehr als zwei Jahrzehnte dauernde Partnerschaft der Föderalen Universität Kasan mit der Universität Gießen wurde vom Deutschen Akademischen Austauschdienst als Vorbild für bilaterale Beziehungen zwischen Forschungs - und Bildungszentren anerkannt.

Das Forum der jungen Wissenschaftler in Kasan entspricht aufs beste dem Konzept des Deutsch - Russischen Jahres der Wissenschaft, weil es Spitzenforschungen unter dem Leitgedanken „Partnerschaft der Ideen" und eine so wichtige Richtung der Arbeit im Wissenschaftsjahr, wie Förderung von jungen Wissenschaftlern, in sich vereint.

Ich bin fest davon überzeugt, dass die Woche des Jungen Wissenschaftlers zu einer guten Grundlage des 2012 beginnenden Deutsch-Russischen Jahres wird, an dessen Veranstaltungen unsere Universität aktiv teilnehmen wird.

Photo: TY 214, wikipedia

Ulrich Brandenburg

Botschafter der Bundesrepublik Deutschland in der Russischen Föderation

Sehr geehrte Damen und Herren,

ich danke herzlich für die Einladung zur Woche des Jungen Wissenschaftlers „Mensch und Energie". Diese Wissenschaftswoche in Kasan markiert einen der Höhenpunkte des Deutsch-Russischen Jahres der Bildung, Wissenschaft und Innovation, das am 23. Mai 2011 von Bundesministerin Prof. Schavan und Minister Prof. Fursenko in Moskau eröffnet wurde. Eine Reihe großer Veranstaltungen, die zahlreiche Facetten der deutsch-russischen Zusammenarbeit in Bildung, Forschung und Innovation widerspiegeln, fand im Rahmen des Jahres bereits statt.

Die Wolga-Region, insbesondere die Republik Tatarstan, engagiert sich beim Ausbau der Beziehungen mit deutschen Partnern in Bildung und Forschung außerordentlich. Ich denke dabei insbesondere an die engen wirtschaftlichen Beziehungen. Bedeutende deutsche Firmen haben in der Region den geeigneten Wirtschaftsstandort gefunden. Zurzeit bereist eine deutsche Wirtschaftsdelegation die Region, um diese Wirtschaftskooperation weiter auszubauen.

Zu erfolgreichen Wirtschaftsperspektiven gehören auch moderne Ausbildung, Forschung und Innovation. Auch in diesem Bereich ist die Republik Tatarstan führend. Deshalb soll die Woche des jungen Wissenschaftlers in Kasan ein Forum für junge Forscher aus unseren beiden Ländern bieten, um den wissenschaftlichen Nachwuchs stärker untereinander zu verbinden. Diese Anstrengungen entsprechen dem Geist des Deutsch-Russischen Wissenschaftsjahres.

Das Deutsch-Russische Wissenschaftsjahr soll zum einen die Exzellenz deutscher und russischer Wissenschaft im jeweiligen Partnerland zum Ausdruck bringen und zum anderen Impulse für die Weiterentwicklung der Bildungs- und Wissenschaftskooperation setzen. Ein besonderer Schwerpunkt des deutsch-russischen Wissenschaftsjahres ist die Nachwuchsförderung. Die Rahmendaten der deutsch-russischen Wissenschafts- und Bildungskooperation können sich wahrlich sehen lassen. Alle deutschen Wissenschaftsorganisationen sind dabei eingebunden: die Alexander von Humboldt-Stiftung, die Deutsche Akademie der Naturforscher Leopoldina, der Deutsche Akademische Austauschdienst, die Deutsche Forschungsgemeinschaft, die Fraunhofer-Gesellschaft, die Helmholtz-Gemeinschaft Deutscher Forschungszentren, die Leibniz-Gemeinschaft, die Max-Planck-Gesellschaft und nicht zuletzt die deutschen Hochschulen.

Mehr als 610 Hochschulpartnerschaften verbinden Universitäten unserer beiden Länder. Im vorigen Jahr haben ca. 4 000 Personen aus Russland ein DAAD-Stipendium für ihr Studium, ihre Forschung oder Sprachkurse in Deutschland erhalten. Damit sind junge russische Wissenschaftler und Studenten die größte ausländische Gruppe, die durch DAAD-Programme gefördert wird. 1 600 deutsche Personen haben Erfahrungen an russischen Universitäten und Forschungseinrichtungen gesammelt.

Die Republik Tatarstan ist dabei besonders aktiv: Es gibt 10 Kooperationsverträge mit Kasaner Hochschulen. Als erste Region Russlands wurde ein ausschließlich von der Republik Tatarstan finanziertes Programm „Jewgenij Sawojskij" für den wissenschaftlichen Nachwuchs dieser Republik mit dem DAAD aufgelegt.

Die gute Wissenschaftspartnerschaft geht aber über den akademischen Austausch weit hinaus. Zu den Leuchttürmen der deutsch-russischen wissenschaftlich-technischen Zusammenarbeit gehören z.B. zwei internationale Großprojekte, XFEL und FAIR. Bei der Errichtung einer Europäischen Freie-Elektronen-Röntgen-

laseranlage (XFEL) beteiligt sich Russland mit 250 Mio. Euro. Dieser Beitrag wird sogar noch erhöht. Beim Projekt „Facility for Antiproton and Ion Research" (FAIR) beläuft sich die russische Beteiligung auf 178 Mio. EUR. Bei beiden Projekten ist Russland der zweitgrößte internationale Partner neben Deutschland, ohne dessen Beiträge die Großvorhaben nicht zu realisieren wären.

Es ist wichtig, dass im Innovationsbereich gemeinsame deutsch-russische Infrastrukturen entstehen. An dieser Stelle denke ich an die Moskauer Vertretung des Clusters Industrielle Biotechnologie CLIB 2021, die vor einem Jahr im Bach-Institut für Biochemie der Russischen Akademie der Wissenschaften eröffnet wurde. Das Cluster wird vom BMBF mit 20 Mio. EUR für die Forschung im Biotechnologiebereich gefördert. Es spricht für die regionale Innovationspolitik, dass dieses Cluster in der vorigen Woche in Kasan beim Informationstag des 7. Forschungsrahmenprogramms der EU vorgestellt wurde. Wir haben großes Interesse daran, diese Instrumente der Innovationsförderung gemeinsam mit den russischen Partnern zu nutzen und weiter zu entwickeln. Und dazu gehören eben vor allem der Aufbau von Clustern und gemeinsame Projekte von Hochschule und Wirtschaft.

Die Teilnahme des Vize-Präsidenten der DFG und des Vize-Präsidenten des DAAD an der Woche des jungen Wissenschaftlers in Kasan ist Ausdruck der Wertschätzung für die Exzellenz der russischer Forschung und Bildung in Tatarstan und für die Bedeutung der Region für unsere Wissenschaftsbeziehungen. An dieser Stelle möchte ich die hervorragende Arbeit der Moskauer Büros der DFG und des DAAD würdigen und den Vertretern der Organisationen für ihr großes Engagement, nicht nur bei dieser Veranstaltung, danken.

Deutschland ist bestrebt, die Wissenschaftsbeziehungen zwischen unseren Ländern weiter zu stärken. Deshalb wollen wir die Arbeit unserer Forschungsorganisationen stärker bündeln und noch sichtbarer machen durch die Einrichtung eines Deutschen Wissenschafts- und Innovationshauses in Moskau. Durch einen gemeinschaftlichen Auftritt der deutschen Wissenschaftsorganisationen soll insbesondere die Visibilität deutscher Innovationsträger gestärkt werden. Das Haus soll die Informationsangebote für russische Wissenschaftler verbessern, Ansprechpartner für russische Wissenschaftsorganisationen sein und Synergien erzeugen. Das DWIH wird mehr Möglichkeiten für die deutsch-russische Diskussion übergreifender Wissenschaftsthemen bieten. Wir werden die Öffentlichkeitsarbeit der deutschen Wissenschaft verbessern können und gemeinsam mit russischen Wissenschaftsorganisationen und Wissenschaftlern neue Ideen für die bilaterale und europäische Zusammenarbeit entwickeln. Ich denke, Herr Dr. Berghorn, der Leiter des Aufbaustabes des DWIH, wird mir darin zustimmen, dass die jetzige Woche ein guter Beitrag dafür ist, diesem Ziel näher zu kommen.

Jetzt möchte ich die Nachwuchswissenschaftler aus Deutschland und Russland direkt ansprechen, die an den Veranstaltungen dieser Woche teilnehmen. Diese Konferenz ist für Sie eine gute Gelegenheit, Ihre Forschungsprojekte und deren Ergebnisse zu präsentieren und direkt mit erfahrenen und führenden Wissenschaftlern mit interdisziplinärer Perspektive zu diskutieren. Nutzen Sie diese Gelegenheit. Knüpfen Sie neue Kontakte, entwickeln Sie neue Ideen und Initiativen.

Ich hoffe, dass der heutige Tag ein guter Start für die intensive Wissenschaftswoche sein wird. Sie sind Gast in einer schönen multinationalen Stadt. Genießen Sie die besondere Atmosphäre des friedlichen Zusammenlebens unterschiedlicher Religionen und Kulturen. Über die Rolle interkultureller Kompetenz als Voraussetzung für erfolgreiche internationale Kooperation brauche ich Ihnen ja nichts zu erzählen.
Ich wünsche Ihnen lebendige Diskussionen mit möglichst vielen neuen Anregungen.

Уважаемые дамы и господа!

Ульрих Бранденбург
Посол Федеративной Республики Германия
в Российской Федерации

Я сердечно благодарю вас за приглашение на «Неделю молодого ученого» на тему «Человек и энергия». Эта научная неделя в Казани является одним из главных событий Российско-Германского года науки, образования и инноваций, открытого 23 мая 2011 года в Москве федеральным министром госпожой Шаван и министром господином Фурсенко. В рамках этого года уже состоялся целый ряд крупных мероприятий, отражающих многочисленные грани немецко-российского сотрудничества в области образования, исследований и инноваций.

Волжский регион, и Республика Татарстан в частности, поддерживает активное сотрудничество с немецкими партнерами в области образования и научных исследований. Здесь я имею в виду особенно тесные экономические связи. Известные немецкие фирмы нашли в этом регионе подходящее место для своей экономической деятельности. В настоящее время по региону проходит тур с участием представителей немецкой экономики с целью дальнейшего расширения экономического сотрудничества.

Современное образование, наука и инновации также являются частью успешных экономических перспектив. И в этой области Республика Татарстан занимает ведущие позиции. Поэтому «Неделя молодого ученого» в Казани должна стать форумом для молодых исследователей из обеих стран и предоставить им возможность завязать крепкие связи. Эта инициатива вполне соответствует духу Российско-Германского года науки.

Российско-Германский год науки должен, с одной стороны, подчеркнуть превосходное качество науки обеих стран, а с другой стороны, дать импульс для дальнейшего развития кооперации в области образования и науки. Особой задачей Российско-Германского года науки является поддержка молодых кадров. Структура российско-германского сотрудничества в области экономики и образования заслуживает особого внимания. Здесь задействованы все немецкие научные организации: Фонд Александра фон Гумбольта, Германская академия естествоиспытателей «Леопольдина», Германская служба академических обменов, Немецкое научно-исследовательское сообщество, Общество им. Фраунгофера, Объединение научно-исследовательских центров Германии им. Гельмгольца, Ассоциация исследовательских институтов им. Лейбница, Общество научных исследований им. Макса Планка и, не в последнюю очередь, немецкие вузы.

Более 610 партнерских программ сотрудничества связывают университеты обеих стран. В прошлом году около четырех тысяч молодых людей из России получили стипендию Германской службы академических обменов на обучение, проведение исследований или прохождение языковых курсов в Германии. Российские молодые ученые и студенты являются самой многочисленной группой в общем числе иностранцев, участвующих в программах DAAD. 1600 немецких студентов получили возможность учиться и работать в российских университетах и научно-исследовательских организациях.

Особую активность проявляет Республика Татарстан: об этом свидетельствуют десять договоров о сотрудничестве с казанскими вузами. Татарстан стал первым регионом, где стартовала совместная с DAAD программа «Евгений Завойский» по поддержке молодых ученых, финансируемая татарской стороной.
Крепкое научное партнерство выходит далеко за рамки академического обмена. К знаковым в сфере российско-германского научно-технического сотрудничества относятся, например,

два крупных международных проекта: XFEL (X-Ray Free-Electron Laser Facility) и FAIR (Facility for Antiproton and Ion Research). Российское участие в проекте по созданию «Рентгеновского лазера на свободных электронах» (XFEL) составляет 250 млн. евро, и сумма еще будет увеличена. Что касается проекта FAIR (Европейский центр по исследованию), то здесь участие России составляет 178 млн. евро. В обоих проектах Россия является вторым по сумме вливаний международным партнером наряду с Германией, без вклада этих двух стран реализация таких проектов вряд ли была бы возможна.

Важно, что в области инноваций создаются совместные российско-германские инфраструктуры. Здесь я имею в виду прежде всего московское представительство кластера промышленной биотехнологии «CLIB 2021», которое было открыто год назад при Институте биохимии им. А.Н. Баха РАН. На создание кластера, занимающегося научными исследованиями в области биотехнологии, Федеральное министерство образования и науки Германии выделило 20 млн. евро. В пользу региональной политики в области инноваций говорит и то, что этот кластер был представлен на прошлой неделе в Казани на информационном дне «Седьмой рамочной программы научных исследований Европейского союза». Мы очень заинтересованы в том, чтобы совместно с российскими партнерами использовать и дальше развивать подобные инструменты поддержки инноваций. К таким инструментам относится в первую очередь создание кластеров и совместные проекты высшей школы и бизнеса.

Участие вице-президента Немецкого научно-исследовательского общества (DFG) и вице-президента Германской службы академических обменов (DAAD) в «Неделе молодого ученого» в Казани свидетельствует о высокой оценке качества российских исследований и образования в Татарстане, а также о значении региона для наших научных отношений. Я хотел бы отметить выдающуюся работу московских представительств DFG и DAAD и выразить свою благодарность сотрудникам этих организаций за их вклад, и не только в рамках этого мероприятия.

Германия стремится и далее укреплять научные связи между нашими странами. Поэтому мы хотим более четко скоординировать работу наших научно-исследовательских организаций и сделать ее более заметной с помощью создания в Москве Германского дома науки и инноваций. Отлаженная работа немецких научных организаций должна усилить видимое присутствие тех, кто отвечает за продвижение инноваций (DWIH). DWIH будет создавать информационные предложения для российских ученых, станет контактной организацией для российских научных организаций и будет способствовать взаимодействию. Германский дом науки и инноваций сможет предложить больше возможностей для российско-германских дискуссий по широкому спектру научных тем. Мы сможем обеспечить активные связи с общественностью для немецкой науки и совместно с российскими научными организациями и учеными будем разрабатывать новые идеи в контексте двустороннего и общеевропейского сотрудничества. Я думаю, что господин доктор Бергхорн, руководитель DWIH, согласится со мной в том, что эта Неделя способствует достижению нашей цели.

Еще я хотел бы обратиться непосредственно к молодым ученым из Германии и России, участвующим в мероприятии. Эта конференция является для вас хорошей возможностью представить свои исследовательские проекты и их результаты и поучаствовать в дискуссиях с опытными учеными в междисциплинарном контексте. Используйте этот шанс. Заводите новые контакты, разрабатывайте новые идеи и инициативы.

Я надеюсь, что сегодняшний день будет хорошим стартом для интенсивной Недели науки. Вы – гости красивого многонационального города. Почувствуйте особую атмосферу мирного сосуществования различных религий и культур. Нет необходимости рассказывать о значении межкультурной компетенции для успешного международного сотрудничества.
Я желаю вам стать участниками оживленных дискуссий и получить как можно больше новых импульсов к дальнейшей работе.

Aleksandr Shcheglov

Vorsitzender des Russischen Verbandes
Junger Wissenschaftler

Александр Щеглов

Председатель совета общероссийской общественной
организации «Российский союз молодых ученых»

Уважаемые участники и гости мероприятия!

Прежде всего хочу поприветствовать всех собравшихся от имени Российского союза молодых ученых – организации, объединяющей молодых ученых и инженеров в масштабах всей нашей страны. Я также хотел бы поблагодарить Немецкое научно-исследовательское сообщество и Германскую службу академических обменов, которые пригласили нас к партнерству в проведении открывающегося сегодня мероприятия.

Сотрудничество России и Германии в научной сфере имеет давнюю историю. И очень символично, что традиция проведения российско-германской недели молодого ученого «Человек и энергия» закладывается именно в 2011 году – в год 300-летнего юбилея великого ученого М.В. Ломоносова, который является своеобразным связующим звеном между российской и германской науками. Получив образование в Германии и вернувшись в Россию, он оставил значимый след в российском и мировом научном наследии. М.В. Ломоносов проявил себя не только в качестве выдающегося ученого и инженера, но и как талантливый организатор отечественной науки, в частности, выступив с инициативой создания в Москве университета, впоследствии названного его именем.

Место проведения – Казанский (Приволжский) федеральный университет – задает высокую планку открывающейся российско-германской «Неделе молодого ученого». Данный университет является одним из старейших и ведущих научно-образовательных центров России, где трудились многие известные российские и зарубежные ученые, среди которых автор неевклидовой геометрии Н.И. Лобачевский, создатель теории строения органических соединений А.М. Бутлеров и др.
Тема «Человек и энергия», выбранная для мероприятия, представляется крайне актуальной не только для России и Германии, но и для всех стран. Современный уровень развития мировой экономики характеризуется возрастающим спросом на энергоресурсы, а рост промышленного производства в развивающихся странах фактически приводит к трансформации глобальной энергетической системы, сложившейся за последние десятилетия.

Однако вследствие ускорения темпов использования энергии перед мировым сообществом встают новые проблемы, связанные с возможными негативными экологическими последствиями наращивания энергетических мощностей, а также с необходимостью рационального и эффективного потребления имеющихся топливно-энергетических ресурсов. Кроме того, в контексте масштабной аварии на АЭС «Фукусима» в Японии, произошедшей в начале 2011 года, человечество должно переосмыслить все вызовы и угрозы, которые влекут за собой современные технологии выработки энергии, обозначив безопасность в качестве одного из основных критериев для развития энергетического сектора.

В связи с вышесказанным роль научных исследований в сфере энергетики существенно возрастает. Перед учеными стоит непростая задача – открыть новые и усовершенствовать имеющиеся альтернативные способы выработки энергии, которые, с одной стороны, обеспечат возрастающие потребности мирового сообщества в энергоресурсах, с другой – будут достаточно безопасными, экологически чистыми и недорогими. В перспективе ощутимую конкуренцию традиционной углеводородной и атомной энергетике должны составить новые технологии, использующие в своей основе современные наукоемкие разработки.

Ускорить создание и обеспечить широкое использование подобных технологий, так необходимых человечеству, возможно посредством развития международного научно-технического сотрудничества в сфере энергетики, которое будет способствовать наиболее полной реализации имеющегося потенциала всех участвующих сторон. В этой связи открывающееся мероприятие, носящее международный характер, имеет особую значимость. Уверен, что оно внесет ощутимый вклад в расширение взаимодействия между молодыми учеными двух стран, занимающихся вопросами энергетики, и придаст дополнительный импульс сотрудничеству России и Германии в научной и научно-технической сферах.

В заключение хочу пожелать участникам и гостям российско-германской недели молодого ученого «Человек и энергия» успешной работы, творческой атмосферы, плодотворных дискуссий, а также новых научных свершений.

Sehr geehrte Teilnehmer und Gäste,

in erster Linie möchte ich alle Anwesenden im Namen des Russischen Verbandes junger Wissenschaftler, einer Organisation, die Nachwuchswissenschaftler und junge Ingenieure landesweit vereint, begrüßen. Ebenfalls möchte ich der Deutschen Forschungsgemeinschaft und dem Deutschen Akademischen Austauschdienst meinen Dank aussprechen, die uns zur Partnerschaft bei der Durchführung der heute zu eröffnenden Veranstaltung eingeladen haben.

Die Zusammenarbeit zwischen Russland und Deutschland im wissenschaftlichen Bereich blickt auf eine lange Geschichte zurück. Deswegen ist es symbolisch, dass die Durchführung der deutsch – russischen Woche des Jungen Wissenschaftlers zum Thema „Mensch und Energie" gerade im Jahr des 300-jährigen Jubiläums von M.V. Lomonossov stattfindet, der eine Art Bindeglied zwischen der deutschen und russischen Wissenschaft darstellt.

Ausgebildet in Deutschland und zurückgekehrt nach Russland, hat er bedeutsame Spuren im russischen und weltweiten wissenschaftlichen Vermächtnis hinterlassen. M.W. Lomonossow bewährte sich nicht nur als hervorragender Wissenschaftler und Ingenieur, sondern auch als talentierter Organisator der einheimischen Wissenschaft, insbesondere als Initiator der Gründung einer Universität in Moskau, die später nach ihm genannt wurde.

Gerade der Ort der Durchführung dieser Veranstaltung, die Föderale Universität Kasan in der Wolga-Region, setzt einen hohen Maßstab in Bezug auf die zu eröffnende deutsch–russische Woche des Jungen Wissenschaftlers. Diese Universität ist eines der ältesten und führenden Wissenschafts– und Bildungszentren Russlands, wo viele bekannte russische und ausländische Wissenschaftler tätig waren, unter ihnen sind N.I. Lobatschewskij, der Entdecker der nichteuklidischen Geometrie, aber auch der Begründer der Theorie über Aufbau der organischen Verbindungen, A.M. Butlerow, und andere zu nennen.

Das für diese Veranstaltung gewählte Thema «Mensch und Energie», ist nicht nur äußerst aktuell für Russland und Deutschland, sondern überhaupt für alle Länder. Das Niveau der modernen Weltwirtschaft wird durch eine zunehmende Nachfrage nach Energieressourcen gekennzeichnet, und der Produktionsanstieg in den Entwicklungsländern führt faktisch zur Transformation des sich in den letzten Jahrzehnten gewachsenen globalen Energiesystems.

Infolge einer sich beschleunigenden Energienutzung kommen allerdings neue Probleme auf die Weltgemeinschaft zu, die mit den negativen Folgen des steigenden Energiebedarfs und einem rationellen und effizienten Verbrauch der vorhandenen Energieressourcen zusammenhängen. Außerdem muss die Menschheit im Zusammenhang mit der zu Anfang 2011 eingetretenen Reaktorkatastrophe in „Fukushima" in Japan alle Herausforderungen und Bedrohungen, die moderne Technologien zur Energieherstellung nach sich ziehen, neu überdenken. Dabei darf die Sicherheit als Hauptkriterium der Entwicklung des Energiesektors nicht zu kurz kommen.

Im Zusammenhang mit diesen Überlegungen nimmt die Bedeutung der wissenschaftlichen Forschungen erheblich zu. Vor den Wissenschaftlern steht die Aufgabe, neue alternative Methoden zur Energiegewinnung zu entwickeln und die schon vorhandenen rationeller zu nutzen. Diese müssen einerseits den wachsenden Bedarf der Weltgemeinschaft an Energieressourcen decken, andererseits sicher, umweltfreundlich und kostengünstig sein. Langfristig müssen die neuen, auf wissenschaftlicher Weiterentwicklung beruhenden Technologien eine spürbare Konkurrenz zu den Energieträgern auf der Basis von Kohlenwasserstoffen und Kernkraft entwickeln.

Die Aufgabe, die Technologien raschestmöglich zu entwickeln und zu verbreiten, wird für die Menschheit unverzichtbar werden. Eine Lösung ist nur auf dem Wege einer internationalen wissenschaftlich-technischen Zusammenarbeit im Energiebereich möglich.

In diesem Zusammenhang kommt dieser internationalen Veranstaltung eine besondere Bedeutung zu. Ich bin sicher, dass sie einen wesentlichen Beitrag zur Zusammenarbeit zwischen den jungen Wissenschaftlern beider Länder, die sich mit Fragen der Energie auseinandersetzen, leistet, und neue zusätzliche Impulse für die Zusammenarbeit zwischen Russland und Deutschland im wissenschaftlichen und wissenschaftlich-technischen Bereich geben wird.

Abschließend möchte ich den Teilnehmern und Gästen der deutsch–russischen Woche des Jungen Wissenschaftlers „Mensch und Energie" erfolgreiches Gelingen, eine kreative Atmosphäre, produktive Diskussionen sowie neue wissenschaftliche Erkenntnisse wünschen.

Prof. Dr. Peter Funke

Professor für Alte Geschichte des Instituts für Epigraphik

an der Westfälischen Wilhelms-Universität Münster

Vizepräsident der Deutschen Forschungsgemeinschaft (DFG)

Meine sehr geehrten Damen und Herren,

ich freue mich sehr, dass Sie der gemeinsamen Initiative des Deutschen Akademischen Austauschdienstes und der Deutschen Forschungsgemeinschaft gefolgt sind und begrüße Sie ganz herzlich zur Ersten Deutsch-Russischen Nachwuchswoche hier in Kasan!

Ich freue mich auch persönlich, hier zu sein, denn es ist das erste Mal, dass es sich in meiner Funktion als Vizepräsident der Deutschen Forschungsgemeinschaft - wie auch als Wissenschaftler - hat einrichten lassen nach Kasan zu reisen. Nachdem wir zum Auftakt des gemeinsamen Deutsch-Russischen Wissenschaftsjahres im Mai in Moskau und St. Petersburg weilten, ist es nur folgerichtig, dass wir diese Wissenschaftswoche heute hier in Kasan eröffnen.

Wie ich lese, hat Kasan ein Patent auf die Bezeichnung als „dritte Hauptstadt" Russlands eintragen lassen - und ich glaube, die Stadt darf sich mit Fug und Recht so nennen. Insbesondere die lange Tradition in Bildung und Forschung und der Ruf der Kasaner Wissenschaftsschulen des 19. Jahrhunderts über die Landesgrenzen hinaus rechtfertigen dies. Ob Ihre Universität dabei, lieber Herr Gafurow, nun die zweit- oder die drittälteste des Landes ist, überlasse ich gern der tiefgreifenden historischen Debatte mit Ihren Amtskollegen der anderen beiden Hauptstädte. Zumindest sind Sie älter als viele deutsche Universitäten, deren Vertreter ich hier und heute ganz herzlich begrüßen darf.

Gestatten Sie mir vielmehr auf zwei Wissenschaftler von Weltruf an Ihrer Alma Mater einzugehen. Lassen Sie mich neben Nikolai Lobatschewskij, dem Begründer der nichteuklidischen Geometrie und heutigem Namenspatron dieser Universität - der übrigens korrespondierendes Mitglied der Göttinger Akademie der Wissenschaften war -, noch einen mir als Historiker vom Fach her etwas näher liegenden Forscher erwähnen: Den großen Slavisten Jan Baudouin de Courtenay.

Als einer der berühmtesten Indogermanisten seiner Zeit begründete er an diesem Ort die Kasaner Schule der Linguistik und ebnete durch seine strukturalistischen Ansätze den Weg von der historischen in die moderne Sprachwissenschaft des 20. Jahrhunderts. In der Person Courtenays spiegelt sich die besondere Beziehung des Standorts Kasan zu Deutschland und Europa wieder – nicht nur weil er an deutschen und russischen Universitäten lehrte und um ein Haar polnischer Staatspräsident geworden wäre, sondern vor allem, weil er den Austausch von modernen Ideen - als leidenschaftlicher Verfechter des Esperanto oder der Rechte von nationalen Minderheiten - von den Grenzen des russischen Zarenreichs bis ins Herz von Europa beförderte.

Und genau aus diesem Grund treffen wir uns auch heute hier, um den Austausch von Ideen zu einem brandaktuellen Thema zwischen unseren Ländern und Europa voranzutreiben. Denn im Mittelpunkt stehen dabei mit dem großen Themenkomplex „Mensch und Energie" globale Probleme, denen sich die Wissenschaft nur im Verbund über Ländergrenzen hinweg widmen kann. Dass dem Nachwuchs dabei besondere Beachtung geschenkt werden muss, liegt in der Natur der Sache. In einigen Jahren werden viele von Ihnen selbständig die heute begonnenen Forschungen weiter treiben und dabei auch Entscheidungen in eigener Verantwortung tragen müssen. Ich glaube, dass diese Tage in Kasan eine ideale Plattform für einen intensiven Gedankenaustausch und eine Basis für zukünftige Kooperationen bieten.

Mit der Nachwuchswoche in Kasan verfolgen wir zwei strategische Ziele: Zum einen werden mit der Präsentation von Spitzenforschung und der Vernetzung des Nachwuchses zwei zentrale Punkte des Wissenschaftsjahres aufgegriffen; und zum anderen wird am Standort Kasan der Austausch mit den wissenschaftlichen Zentren in den Regionen vorangetrieben - denn auch hier wird auf hohem Niveau von Interesse für Deutschland geforscht. Insofern hoffe ich sehr, dass wir die Idee der „Woche des Jungen Wissenschaftlers" verstetigen können und damit die Beziehungen unserer Länder nachhaltig stärken.

Gestatten Sie mir an dieser Stelle noch ein paar Worte zur DFG. Die Deutsche Forschungsgemeinschaft ist heute der größte Forschungsförderer in Europa. Mit einem Jahresbudget von knapp zweieinhalb Milliarden Euro unterstützen wir die Entwicklung der Grundlagenforschung an Hochschulen und Forschungsinstitutionen. Dabei spielt Russland im internationalen Förderhandeln der DFG eine führende Rolle. So ist die DFG seit 2003 hier mit einer eigenen Auslandsrepräsentanz vertreten und finanzierte allein in den letzten drei Jahren über 400 Projektanträge mit Beteiligung russischer Forscher.

Im laufenden Wissenschaftsjahr wird aber auch insbesondere die lange Historie der bilateralen Beziehungen betont. So pflegte die DFG bereits seit der Gründung ihrer Vorgängerorganisation im Jahr 1920 enge Kontakte zur Russischen Akademie der Wissenschaften und förderte somit das Zusammenwirken beider Forschernationen. Der Wissenschaftleraustausch in den 1960er und 70er Jahren oder die DFG-Sonderprogramme in den 1990er Jahren zur Förderung bilateraler Kooperationen nach der Auflösung der Sowjetunion seien etwa als wegweisende Stationen genannt.

Mittlerweile arbeiten deutsch-russische Forschungsgruppen von Kaliningrad bis Wladiwostok und vom Nordkaukasus bis zur Kola-Halbinsel an gemeinsamen DFG-Projekten. Beispiele dafür finden sich auch in Tatarstan, insbesondere in den Gebieten der Chemie, der Physik und der Mathematik, aber auch in der Geologie und in den Sozialwissenschaften. Mit einem Finanzvolumen von über einer halben Million Euro förderte die DFG allein in den letzten fünf Jahren 25 Projekte mit Beteiligung Kasaner Wissenschafts- und Forschungsinstitutionen, wie z.B. dem Arbusow-Institut, dem Sawojskij-Institut und der Föderalen Universität.

Neue Perspektiven der Zusammenarbeit ergeben sich nun im Zuge der aktuellen Reformen der russischen Hochschullandschaft. Das Vorhaben, die Forschung an den Hochschulen zu stärken, begrüßen wir sehr. Damit werden die Erkenntnisse der Forschung ohne Umweg in die Lehre integriert und zugleich die Studierenden als Akademiker von Morgen frühzeitig an das wissenschaftliche Arbeiten herangeführt. Ich bin sicher: Die neuen Föderalen Universitäten und die Forschungsuniversitäten Kasans werden begehrte Partner sein. Dies gilt insbesondere für die sogenannten deutschen Eliteuniversitäten. Sie wissen vermutlich, dass derzeit die zweite Runde der Exzellenzinitiative in Deutschland läuft. Hier werden Ihnen zahlreiche neue Partner geboren, beziehungsweise bereits bestehende Partnerschaften besser ausgestattet.

Meine Damen und Herren, lassen Sie uns daher diese Tage in Kasan nutzen, um unseren Kooperationen eine neue Qualität zu verleihen. Ich denke, wir dürfen gespannt sein, wie es gemeinsam weitergeht, aber eines ist jedoch sicher, dass der Standort Kasan auch über das Wissenschaftsjahr hinaus im Fokus der DFG bleiben wird, denn es ist uns ein besonderes Anliegen die institutionelle Kooperation mit den hiesigen Partnern auszubauen. Ich wünsche Ihnen und uns allen eine erfolgreiche erste Deutsch-Russische „Woche des Jungen Wissenschaftlers".

Многоуважаемые дамы и господа!

Проф. д-р Петер Функе

Профессор истории древнего мира института эпиграфики

в Вестфальском университете имени Вильгельма в Мюнстере

Вице-президент Немецкого научно-исследовательского сообщества (DFG)

Я очень рад, что вы откликнулись на инициативу Германской службы академических обменов (DAAD) и Немецкого научно-исследовательского сообщества (DFG), и сердечно приветствую вас от всего сердца на первой российско-германской «Неделе молодого ученого» здесь в Казани!

Я также рад оказаться здесь, так как впервые в жизни мне и как вице-президенту Немецкого научно-исследовательского сообщества, и как ученому довелось приехать в Казань. После открытия в мае двустороннего Российско-Германского года науки в Москве и Санкт-Петербурге, открытие нами этой научной недели здесь, в Казани, представляется совершенно логичным.

Насколько я знаю, Казань считается «третьей столицей» России, и я думаю, что город имеет полное право так называться. Основанием для этого является долгая традиция в образовании и науке, а также репутация казанских научных школ XIX века, известная далеко за пределами страны. Является ли ваш университет, дорогой господин Гафуров, вторым или третьим по возрасту университетом страны, – этот вопрос я охотно оставляю вашим коллегам из двух других столичных городов для серьезных исторических дебатов. По крайней мере, ваш университет старше, чем многие немецкие университеты, представителей которых я сегодня здесь сердечно приветствую.

Позвольте мне подробнее рассказать о двух известнейших ученых вашего университета. Наряду с Николаем Лобачевским, основателем неэвклидовой геометрии и сегодняшним покровителем этого университета, бывшего, кстати, членом-корреспондентом Гёттингенской академии наук, я хотел бы упомянуть еще одного, мне как историку более близкого по своей специальности исследователя, – великого слависта Яна Бодуэна де Куртенэ. Один из самых известных индогерманистов своего времени, он основал здесь Казанскую лингвистическую школу; предложенный им структуралистический подход стал связующим звеном от исторического к современному языкознанию XX столетия. В личности Куртенэ нашло отражение особое положение Казани по отношению к Германии и Европе, и не только потому, что он преподавал в немецких и российских университетах и чуть не стал польским президентом, а прежде всего потому, что он, будучи ярым поборником эсперанто и прав национальных меньшинств, способствовал передаче современных идей от границ российского царства к самому сердцу Европы.

Именно по этой причине мы и встречаемся сегодня здесь: чтобы осуществить обмен идеями между нашими странами и Европой по самой животрепещущей теме. Так как в центре нашего внимания в тематическом комплексе «Человек и энергия» стоят глобальные проблемы, рассматривать которые возможно только сообща, не обращая внимания на государственные границы. Очевидно, что ведущую роль должно играть подрастающее поколение. Через несколько лет многие из вас самостоятельно продолжат начатые сегодня исследования и будут нести груз ответственности за принятые решения. Я полагаю, что эти дни в Казани представляют собой идеальную платформу для интенсивного обмена мыслями и базу для будущего сотрудничества.

Проводя «Неделю молодого ученого» в Казани, мы преследуем две стра-

тегические цели: с одной стороны, представляя выдающиеся исследования и объединяя представителей подрастающего поколения, мы выполняем две центральные задачи Года науки, а с другой стороны, в Казани мы поддерживаем сотрудничество с региональными научными центрами, так как проводимые здесь передовые исследования представляют интерес для Германии. Поэтому я очень надеюсь, что «Неделя молодого ученого» станет регулярным мероприятием и послужит тем самым укреплению отношений между нашими странами.

Разрешите мне на этом месте сказать пару слов о Немецком научно-исследовательском сообществе (DFG). Немецкое научно-исследовательское сообщество является сегодня самым большим спонсором науки в Европе. С годовым бюджетом в почти два с половиной миллиарда евро мы поддерживаем развитие фундаментальных научных исследований в высших учебных заведениях и научно-исследовательских институтах. При этом Россия занимает в международном распределении грантов DFG одно из ведущих мест. С 2003 года DFG имеет здесь свое Представительство, и только за последние три года нами было профинансировано более 400 проектов с участием российских исследователей.

В рамках текущего Года науки особо отмечается долгая история двусторонних отношений. Еще с момента основания организации-предшественницы DFG поддерживало тесные контакты с Российской академией наук и, таким образом, способствовало взаимодействию двух наций. Значительными вехами на пути развития двусторонних кооперационных связей можно считать обмен учеными в 1960–70-х годах или специальные программы DFG в 1990-х годах после распада Советского Союза.

Сейчас российско-германские группы исследователей работают над совместными проектами DFG на территории от Калининграда до Владивостока и от Северного Кавказа до Кольского полуострова. Примеры такого сотрудничества мы находим и в Татарстане, в частности, в таких областях как химия, физика и математика, а также геология и общественные науки. Только за последние 5 лет финансовая поддержка DFG в размере более полутора миллионов евро была предоставлена 25 проектам с участием казанских научных учреждений, например, института Арбузова, института Завойского и Федерального университета.

Новые перспективы в сотрудничестве открываются благодаря реформам вузовского ландшафта. Мы горячо приветствуем намерение интенсифицировать исследования в высших учебных заведениях. За счет этого происходит конвертирование результатов исследований непосредственно в учебный процесс, и вместе с тем будущие выпускники заблаговременно приобщаются к научной работе. Я уверен, что Федеральный университет и новые исследовательские университеты Казани будут очень востребованными партнерами. Это относится, в частности, к так называемым немецким «элитным» университетам. Вы, вероятно, знаете, что в настоящее время в Германии проходит второй тур экселленц-инициативы для университетов (Exzellenzinitiative). Там рождаются ваши новые многочисленные партнеры, либо уже существующие партнерства получают лучшее оснащение.

Итак, дамы и господа, давайте используем эти дни в Казани для того, чтобы вывести сотрудничество на новый качественный уровень. Очень любопытно, как наше сотрудничество будет развиваться дальше, но одно могу сказать наверняка: город Казань и после завершения Года науки останется в фокусе внимания DFG, расширение институционального сотрудничества с казанскими партнерами входит в нашу сферу интересов. Я желаю вам и всем нам больших успехов в ходе первой российско-германской «Недели молодого ученого».

Prof. (em.) Dr. Max Huber

Vizepräsident des Deutschen Akademischen Austauschdienstes (DAAD)

Liebe Teilnehmerinnen und Teilnehmer der Konferenz,

als Vizepräsident des DAAD, der auf eine langjährige Tätigkeit in dieser größten europäischen, gar weltweiten Organisation zurückblicken kann, habe ich viele Länder, viele Hochschulen und viele Rektoren kennen gelernt. In Europa, in Amerika, in Asien. Aber mit besonderer Freude bin ich heute zum zweiten Mal in Kasan. Wie kommt das?

Es ist nicht nur die Stadt, die Universität, die mir gefallen, es ist nicht nur, weil der frühere DAAD-Präsident und mein Kollege Theodor Berchem hier Ehrenprofessor geworden ist. Ich glaube vielmehr, dass deutsche Hochschulen eine besondere Beziehung zu Kasan haben. Denn es waren Professoren, Privatdozenten und junge Wissenschaftler, die bei der Gründung dieser Universität zu Beginn des 19. Jh. akademisch mitgewirkt haben. Und auch später, im Laufe des ganzen19. Jh. und danach, waren immer wieder deutsche Professoren in Kasan. Der Mediziner Karl Fuchs ist sicherlich der bekannteste, aber nicht der einzige Deutsche unter ihnen gewesen. Und fast ist man geneigt zu sagen, dass Kasan und seine alte Universität bis in die Mitte des 20. Jh. in Deutschland bekannter gewesen ist, als es in der Zeit nach 1945 war. Eine Herausforderung für den DAAD, daran zu arbeiten, dass Kasan wieder so bekannt wird wie Prag, Warschau, Ljubljana oder Budapest, um im osteuropäischen Raum zu bleiben.

Hervorzuheben ist die Pionierleistung der Universität Gießen, die bereits Anfang der 90er Jahre mit der Universität Kasan eine Partnerschaftsvereinbarung einging. Unter den Experten in Deutschland gilt Kasan als eine anerkannte Universität, wenn es um Chemie, Biowissenschaften oder Medizin geht. Nicht zufällig findet, parallel mit unserer deutsch-russischen Woche des Jungen Wissenschaftlers, eine große Chemiekonferenz statt. Wir haben nicht nur das Jahr der deutsch-russischen Wissenschaft, Bildung und Innovation, sondern auch das Jahr des Chemikers.

Kasan steht für Innovation. Das zeigen uns die beeindruckenden Forschungsergebnisse, der Ruf der Universität und die Forscherpersönlichkeiten wie Bechterew, Butlerow, Lobatschewskij, Baron de Courtenay, Wawilow und viele mehr. Daher haben wir auch Kasan als den Ort für eine Konferenz ausgewählt, die es in der Veranstaltungsgeschichte des DAAD in dieser Form bisher nicht gab, weder hier in Russland noch in einem anderen Land, wo der DAAD aktiv ist. Junge deutsche und junge ausländische, in diesem Fall junge russische Wissenschaftler kommen unter Mitwirkung erfahrener Wissenschaftler beider Länder zu einem Gedankenaustausch zu einem hochaktuellen Thema zusammen.

„Mensch und Energie“ soll das Thema der ersten Woche dieser neuen Veranstaltungsart sein, und ich betone ausdrücklich, dass wir das Thema bereits vor Fukushima festgelegt hatten.
Die Energiefrage entscheidet mit über die Zukunft, und die Zukunft gehört den jungen Leuten. Es ist also nur folgerichtig, dass diese sich dann zu diesem Thema stellen sollen.
Als Zar Alexander I. 1805 die Universität Kasan gründete, tat er es mit Voraussicht und Mut. Es war Voraussicht, an der damaligen Nahtstelle Europa-Asien eine Universität zu gründen. Es bedeutete Mut, dieses an einem von Europa – damaligen Verständnisses – weit entfernten Ort, fernab der bekannten Zentren zu tun. Aber seine Rechnung ging auf. Er vertraute auf die Fähigkeiten der Menschen, auf die

Kollegialität der Wissenschaftler untereinander, er vertraute aber auch der Energie, der Kreativität und der Initiativfreudigkeit der jungen Menschen.

Und diese Elemente, diese Elixiere – Jugend, Energie, Kreativität – sind die menschlichen Komponenten, die wir für unsere Arbeit, auch für unsere Veranstaltung benötigen. Junge Wissenschaftler diskutieren über Probleme von morgen und finden Lösungen, junge Leute aus Berlin, aus Freiburg, aus Stuttgart und Bonn, aber auch junge Wissenschaftler aus allen Regionen dieses Landes, aus Murmansk und Archangelsk im Norden, aus Naltschik im Kaukasus, aus Tomsk, Abakan und Novosibirsk in Sibirien, aus dem Fernen Osten, von der Wolga, aus dem Ural, aus St. Petersburg, Moskau und natürlich aus Kasan. Das partnerschaftliche Miteinander, das zwischen Deutschland und Russland im Großen in der Modernisierungspartnerschaft und der Strategischen Partnerschaft zu finden ist, spiegelt sich hier konkret in dieser Konferenz wider. Und so wird eine der zentralen Inhalte des Deutschen Hauses für Wissenschaft und Innovation, ein Forum für den deutsch-russischen Wissenschaftsdiskurs zu sein, erfüllt.
Der DAAD ist in seiner Arbeit, neben der Vergabe individueller Stipendien, ganz wesentlich auf partnerschaftliche Förderung orientiert und ist damit in Europa konzeptionell führend. Ein großer Anteil der ca. 67 000 Förderungen des DAAD pro Jahr geht in bilaterale, partnerschaftlich konzeptionierte Projekte. Die Pflege wissenschaftlichen Nachwuchses, künftiger Forscher und Hochschullehrer, ist uns ein großes Anliegen. So haben wir seit 2004 mit Russland konsequent gemeinsam finanzierte Programme aufgebaut. Das Lomonossow- und das Kant-Programm mit dem russischen Bildungsministerium, zwei Programme mit den Staatlichen Universitäten in Moskau und St. Petersburg, aber vor allem auch mit der Republik Tatarstan. Es gibt das Lobatschewskij-Programm für Masterstudenten, das Sawojskij-Programm für den wissenschaftlichen Nachwuchs an Hochschulen Tatarstans. Beide Programme gelten als beispielgebend, sind leuchtende Orientierungspunkte gelungener akademischer Kooperation zwischen unseren Ländern.

Die Kooperation mit Ihnen, Herr Minister Gilmutdinow, gehört mit zu den Vorbildern einer zielorientierten, deutsch-russischen Wissenschaftszusammenarbeit. Lassen Sie uns sie vertiefen und fortsetzen. Wissenschaft kennt keine Grenzen, meine Rede aber sollte ich jetzt beenden, nicht jedoch ohne Ihnen und uns allen eine erfolgreiche Tagung zu wünschen und all denen zu danken, die an ihrem Zustandekommen mitgearbeitet haben. Dem Ministerium, dem Rektor der KFU meinen Dank, Ihnen allen gute Gespräche, aber auch eine ruhige Minute, die Sehenswürdigkeiten dieser Stadt zu betrachten.
Ich denke, Kasan ist eine Reise wert.

Photo: TY 214, wikipedia

Уважаемые участники конференции!

Проф. д-р Макс Хубер

Вице-президент Германской службы академических обменов (ДААД)

Как вице-президент Германской службы академических обменов, имеющий за плечами многолетний опыт работы в этой самой крупной европейской, да и международной, организации, я имел возможность познакомиться со многими странами, вузами, со многими ректорами в Европе, Америке и Азии. Но сегодня, приехав второй раз в Казань, я испытываю особую радость.

И не только потому, что мне нравятся город и университет, и не потому, что предыдущий президент DAAD и мой коллега Теодор Берхем получил здесь звание почетного профессора. Скорее, мне кажется, у немецких институтов особое отношение к Казани, потому что многие профессора, приват-доценты и молодые ученые из Германии принимали активное участие в создании этого университета в начале XIX века. И потом, в течение всего XIX века, и позже немецкие профессора постоянно присутствовали в Казани. Медик Карл Фукс является, по всей видимости, самым знаменитым, но далеко не единственным немцем. И почти с уверенностью можно сказать, что Казань и ее старый университет до середины XX столетия пользовался в Германии более широкой известностью, чем после 1945 года. DAAD готова работать над тем, чтобы Казань снова стала такой же популярной, как Прага, Варшава, Любляна или Будапешт, и осталась в восточно-европейском пространстве.

Следует особо отметить заслуги первопроходца – университета города Гисена, который еще в начале 90-х годов подписал договор о партнерстве с Казанским университетом. Эксперты в Германии высоко оценивают Казань, когда речь идет о химии, биологических науках или медицине. Не случайно одновременно с нашей российско-германской «Неделей молодого ученого» здесь проходит большая конференция по химии. Сейчас идет не только Российско-Германский Год науки, образования и инноваций, но и год химика.

Казань открыта для инноваций. Это показывают и впечатляющие результаты исследований, и репутация университета, и личности исследователей, таких как Бехтерев, Бутлеров, Лобачевский, Бодуэн де Куртенэ, Вавилов и многие другие. Поэтому мы выбрали Казань для проведения конференции в формате, какого еще не было в истории мероприятий DAAD ни здесь, в России, ни в какой-либо другой стране, где DAAD ведет активную работу. Молодые немецкие и иностранные ученые, в нашем случае русские, встречаются для обмена мыслями по очень актуальной теме при содействии опытных ученых двух стран.

«Человек и энергия» – такой станет тема первой научной «Недели» в новом формате, и я особо обращаю ваше внимание на то, что мы определились с темой еще до Фукусимы.

Вопрос энергии имеет решающее значение для будущего, а будущее принадлежит молодым людям. Поэтому представляется логичным, что именно они должны высказаться по данной теме.
Когда царь Александр I в 1805 году основал Казанский университет на тогдашнем стыке Европы и Азии, это было весьма дальновидное решение. Особое мужество заключается в том, чтобы основать университет в этом, по

тем представлениям, крайне удаленном от Европы месте, вдали от известных центров. Но его расчет оправдался. Он верил в способности человека, в коллегиальность ученых, он верил в энергию, в творческие силы и инициативность молодых людей.

Молодость, энергия, творчество – это компоненты, необходимые для нашей работы и для проведения нашего мероприятия. Молодые ученые обсуждают проблемы завтрашнего дня и находят решения – молодежь из Берлина, Фрайбурга, Штутгарта и Бонна, молодые ученые из всех регионов этой страны, из Мурманска и Архангельска на севере, из Нальчика на Кавказе, из Томска, Абакана и Новосибирска в Сибири, с Дальнего Востока, с Волги, с Урала, из Санкт-Петербурга, Москвы и, конечно, из Казани. Партнерство, существующее между Германией и Россией в общем контексте модернизационного и стратегического сотрудничества, нашло свое конкретное воплощение в этой конференции. И таким образом реализуется один из центральных замыслов Германского дома науки и инноваций: быть форумом для российско-германского научного дискурса.

DAAD ориентирована в своей работе, помимо предоставления индивидуальных стипендий, на существенное продвижение партнерства и является, таким образом, в концептуальном плане лидером в Европе. Значительная часть из порядка 67 тысяч ежегодных грантов DAAD направлена на поддержку двусторонних парнерских концептуальных проектов. Забота о молодом поколении ученых, о будущих исследователях и преподавателях вузов является нашей первоочередной задачей. С 2004 года мы с Россией последовательно работаем над созданием совместно финансируемых программ. Программы «Михаил Ломоносов» и «Иммануил Кант» с участием российского министерства образования – это две совместные программы с государственными университетами Москвы и Санкт-Петербурга и с Республикой Татарстан. Еще есть программа «Николай Лобачевский» для студентов-магистров, программа «Евгений Завойский» для молодых ученых, работающих в вузах Татарстана. Обе программы считаются образцовыми и являются яркими ориентирами для успешного академического сотрудничества между нашими странами.

Сотрудничество с вами, господин министр Гильмутдинов, также является примером целенаправленного российско-германского научной кооперации. Давайте будем продолжать и углублять это сотрудничество. Наука не признает границ, однако я не могу закончить свою речь, не успев пожелать вам и нам всем успешной конференции и поблагодарить всех тех, кто участвовал в ее организации. Моя благодарность министерству, ректору Казанского федерального университета. Надеюсь, нам предстоят интересные обсуждения, и вместе с тем останется несколько спокойных минут для того, чтобы посмотреть этот город. Я думаю, что Казань стоит того, чтобы ее посетить.

Photo: TY 214, wikipedia

"What will we be talking about?"

Introductory remarks by Prof. Dr. Max Huber, DAAD

There is a lot of research organizations in Germany; besides universities which combine teaching and research we have a manifold landscape of various organizations dealing with research, in different approaches, with various goals, they are supported by the Federal Government, by "Länder" Governments, industrial foundations or funds or by private donors.
The most commonly known organizations, both in Germany and abroad, are the Deutsche Forschungsgemeinschaft – DFG – (German Research Foundation), Max Planck Society, the Helmholtz Association, Fraunhofer Society. All these organizations support science and research as such, they finance projects, materials, expeditions, technology, experiments and the scientific staff involved.
In contrast to these DAAD and the Alexander von Humboldt-Foundation support the individual only, they do not support projects.
DAAD, DFG, Helmholtz and the Deutsches Historisches Institut (German Institute for Historic Research) have long since established representations or offices in Russia, in Moscow. Fraunhofer Society gave up its office, but has plans to come back.
The foreign policy of the Federal Republic of Germany has practised a special branch of foreign policy ever since the Republic has been founded. Besides real policy and economic policy Germany has successfully practised "Außenkulturpolitik", foreign cultural policy; besides DAAD the Goethe-Institute is the most outstanding and most famous example for this kind of policy.
As science and research have become more and more vital for development, society, progress and stability, alongside with the globalisation of ideas and economy. Germany introduced the idea of a new branch of foreign policy, the "Außenwissenschaftspolitik".

We may translate it by foreign science and research policy.

It was Minister Steinmeier in 2007 who proclaimed this new idea and had the idea of "Wissenschaftshäuser", Centres of research, developed.

This is why we now have these Centres in scientifically prospective countries, such as USA/New York, India/New Dehli, Japan/Tokio, Brasil/Sao Paolo and Russia/Moscow.
Science and research, however, are inevitable prerequisites for innovation and technological progress, but innovation itself does require management skills and capabilities as well as economic experience and know-how, to get successfully launched. Therefore, besides the organizations of research, the German economy has been integrated into the concept of the Centres.

With DAAD, DFG, Helmholtz, and the representation of the German economy and the German Institute of Historic Research having offices in Moscow, the idea was born to have them associated into a "club", a Centre, which enables them to attract the attention of the Russian academic world to German Science.
The mission of the Centre is to form a forum, on which German research can be represented, on which a German-Russian dialogue can be practised. Research institutions for Russian and German scientists and as a particularly important goal the junior staff in science and research ought to be developed.
That is, why we started, here in Kazan, with the "First German-Russian week of the young researcher".

Keeping in mind what I told you about our German House, and about the basic function of the DAAD – the support of individuals –, it will become obvious that this "First Russian-German week of young researchers" fully fits both into the Centre Concept and the DAAD policy of scientists support. It is an event where young researchers of two countries come together for a dialogue on a scientifically exciting topic. DAAD gets people together, this is the cultural aspect. What happens then is science. And this is within the competence of the DFG.

Prof. (em.) Dr. Max Huber
Vice-President of the German Academic Exchange Service (DAAD)

Introductory remarks by Prof. Dr. Peter Funke, DFG

In actual fact, both of our organizations – the DAAD and the DFG – show responsibility for science and the development of fundamental research. And indeed it is this "Week of the Young Researcher" where the two funding agencies DAAD and DFG meet: Supporting the mobility of young scientists and their research activities.

And especially abroad - here in Russia, in Kazan - it all makes so much sense to combine the on-site experience of the DAAD and their Lecturer, Herr Zinecker, whom we have to thank a lot for the careful preparation of the conference -, and the research expertise of the DFG, who has funded quite a few projects at Kazan research institutions over the last few years. That is why we originally had the idea to organize such a conference together and that is why we are trying to share this introduction here.

But Herr Huber has already pointed out that the German Centre for Research and Innovation - das Deutsche Haus für Wissenschaft und Innovation -, which at the moment is being established in Moscow, is host to many more German organizations such as the DFG and DAAD. That is why I am very happy to see this week here in Kazan representatives from the Max-Planck-Society, the Alexander von Humboldt-Foundation and the Freie Universität Berlin. But, as a matter of fact, even more grateful we have to be to all the researchers to have come a long way to Kazan. Without your involvement such a week would not have been possible. So a great many thanks to all the Germans from Berlin, Bonn, Dresden, Freiburg, Jülich, Stuttgart, Würzburg – and finally – if I may add, from Münster, because this is where I am from!

But some of our Russian colleagues surely had a longer and more tiring journey to come here, because you live further away from Kazan than we Germans do. So it is a great pleasure to welcome you from all parts of the vast territory of the Russian Federation: from Abakan, Arkhangelsk, Gorno-Altaisk, Khabarovsk, Krasnoyarsk, Moscow, Murmansk, Nalchik, Omsk, Saratov, St. Petersburg, Tomsk, Cheboksary, Chelyabinsk, Tver, Ufa, Ulyanovsk, Volshsky, Yekaterinburg, and last but not least from Kazan. An indeed without the help of our friends from Kazan University and the Savoisky Institute, in particular Academican Salikhov and Laila Mosina, we could not celebrate the opening of this week here today in this fashion.

Obviously the active role of ROSMU, the Russian Union of Young Scientists, and their Chairman, Aleksandr Shcheglov, has to be underlined here, too. Without the strong input of your union it would have been very difficult to match young researchers from Germany and Russia at eye level. And to bring all these young and promising talents together with renowned senior scientists - like Oliver Paschereit and Eckart Rühl - makes this week so much more interesting for all of us.

The DFG as the central, self-governing research funding organization in Germany has been active in Russia for many decades now. Why Russia? We believe that there is considerable research potential to be realized in many areas of science and the humanities. We have always put a special focus on countries that allow scientific cooperation to be carried out on an equal footing. Within our agreements and bilat-

Identifying and exploiting synergies between various aspects and various scientific approaches towards energy will surely be the key to tackle global challenges like this.

eral programmes with the Russian Academy of Sciences, the Russian Foundation for Basic Research - RFFI, and the Russian Foundation for Humanities - RGNF, innumerable conferences, symposia, visits and research projects have been implemented in all areas of research, often leading to sustainable integrated networks. Our liaison office in Moscow, as one of only seven DFG offices world-wide, underlines the fact that Russia plays a key role as one of our most important strategic partners. But I will stop here at this point because my colleagues will go into detail later this week and present how the DFG fosters bilateral collaboration and facilitates cooperation especially among young researchers.

We have heard now - why the DFG is in Russia. And we have heard - why we are in Kazan today. And we have already heard - why we focus on the support of young researchers this week. But we have not heard about the actual topic of this conference? Why did we choose "Man and Energy" as a major topic? Let my briefly explain why. There are three good reasons for it.

First of all it is the interdisciplinarity of the topic that allows us to invite many different researchers from many different disciplines to set up interdisciplinary networks. We believe that this diversity will be a source for finding new ideas. Identifying and exploiting synergies between various aspects and various scientific approaches towards energy will surely be the key to tackle global challenges like this. Secondly, the topic of energy and climate change is a hot issue at the moment, because everybody wants to know how life on earth will go on, especially after Fukushima. The president of the DFG, Matthias Kleiner, has just been asked by German Chancellor Angela Merkel to chair an ethic committee on energy questions. And of course there are these and other political aspects that have led the German Federal Ministry of Education and Research to initiate a very successful Year of Science in 2010 by the title of: "The Future of Energy". And - thirdly - we thought it prudent to combine last year's topic with the current German-Russian Year of Science. After all, energy has long been a priority topic of mutual interest for German and Russian political and scientific platforms, partnerships and agreements.

But now my colleague Herr Huber and I have talked a lot and we do not want to repeat ourselves here. I am afraid you will have to listen to us and our wisdom again today and tomorrow anyway. Also, I have already said quite a few words in German and in English – and there are so many great minds among us that haven't even said a single word in either language yet. So it is high time for us to finish and have the young scientists and the experts speak! And I am really looking forward to today's key-note. It is a great pleasure to introduce Oliver Paschereit, who will after all these words of welcome finally arrive at science - as he poses the question of Green Energy. Professor Paschereit is the Chair of Fluid Dynamics at the Technische Universität Berlin. And not so long ago he earned an Advanced Grant by the European Research Council (ERC) - worth more than three million Euros - for his innovative research in energy technologies. We highly appreciate his and his young colleagues' presence as speakers this week.

And this ERC-grant brings me to the last point of my introduction. From the very beginning, one of the main objectives of DFG´s activities in Russia has been to contribute to Russia's integration into Europe. Integrating the Russian scientific communities into the European Research Area will make the research systems in Germany, in Russia, and in Europe as a whole, more competitive. We should use the strength of our collaboration to join forces and become even more competitive. Let me close by saying that I truly hope this conference will send out a strong message of encouragement to the research communities of young scientists in Russia and Germany to extend their successful cooperation – even on the European level.

Thank you very much for your kind attention! We are all looking forward to many fruitful discussions this week. And now, I pass on to our distinguished speaker! Oliver Paschereit, the floor is yours!

Prof. Dr. Peter Funke
Professor of Ancient History at the Institute of Epigraphy
at the Westphalian Wilhelm University of Münster,
Vice-President of the DFG

CONTRIBUTIONS OF SENIOR GERMAN AND RUSSIAN RESEARCHERS

Prof. Christian Oliver Paschereit, TU Berlin
Prof. Eckart Rühl, Freie Universität Berlin
Prof. Kev Salikhov, Zavoisky Institute Kazan
Dr. habil. Helmut Weidner, Social Science Research Centre Berlin
Prof. Ilgiz Garifullin, Zavoisky Institute Kazan
Prof. Sabine Ludwigs, University of Stuttgart
Prof. Nail Sakhibullin, Kazan Federal University
Dr. Frank Goldschmidtböing, University of Freiburg

CONTRIBUTIONS OF YOUNG RUSSIAN AND GERMAN RESEARCHERS

Alexey Alfonsov, Leibniz Institute, Dresden
Svetlana Akchurina, MEI Moscow
Andrey Beglyarov; MISU Moscow
Bernhard C. Bobush, TU Berlin
Christoph H. Braun, University of Stuttgart
Bernhard Ćosić , TU Berlin
Sergey Dmitriev, TU Moscow/Volzhsky
Raisa Epikhina, MSU Moscow
Dennis Friedrich, Helmholtz Centre Berlin
Ramil Gainov, Federal University Kazan
Sebastian Göke, TU Berlin
Sandu-Daniel Kopp, Freie Universität Berlin
Alina Korneyeva, Russian Federal Nuclear Centre Sarov
Aleksandr Korotkikh, Polytechnic University Tomsk
Paul Kowitz, Freie Universität Berlin
Aleksandra Kurchevskaya, University of St. Petersburg
Marina Ledeneva, University of Volgograd
Konstantin Leshchenko, University of St. Petersburg
Steffen Link, University of Stuttgart
Oxana Muravyeva, University of St. Petersburg
Veronika Okhatrina, University of St. Petersburg
Dmitry Shnayder, University of Chelyabinsk
Yulija Svenskaya, University of Saratov
Aleksander Timofeev, TU Tver
Igor Tonkoshkurov, University of Abakan
Pavel Tverdunov, Agrarian Academy of Ulyanovsk
Stanislav Yeroshenko, Federal University of Ekaterinburg

SENIOR SCIENTISTS

Prof. Dr. Christian Oliver Paschereit

Chair of Fluid Dynamics,
Institute of Fluid Dynamics and Technical Acustics (ISTA),
Technical University Berlin

Professor Paschereit a mechanical engineer, was offered the Chair of Fluid Dynamics at Berlin Technical University in 2003. In 2009, he received a prestigious Advanced Grant from the European Research Council (ERC). His scientific interest lies in the development of technologies for efficient energy conversion with minimal CO2 impact. Application areas deal with transportation, energy generation, gas turbines and wind turbines. He is an inventor and co-inventor of more than 70 patents in the fields of turbo machinery, combustion technology, fluid dynamics and acoustics. He is a member of the American Physical Society (APS), the American Society of Mechanical Engineers (ASME), and the American Institute of Aeronautics and Astronautics (AIAA).

"Green Energy?"

Global energy consumption is continuously increasing, leading to an additional world wide demand for new power generation installations in the near future. In order to protect the earth's climate, energy conversion efficiency and the use of sustainable resources have to be improved significantly to reduce the emission of the greenhouse gas CO2. To maintain our high standard of living and to enhance it for developing countries, the improved technologies have to be cost-neutral.

Gas turbines and wind turbines play today a major role in energy generation. However, current turbine technology experiences a flattening technology curve, and further increase in efficiency only can be achieved in incremental small steps. Flow and combustion control can lead to leap frogging systems with high efficiency and low emissions. An approach combining very fundamental work with applied research is presented and shows significant improvements in efficiency and emissions.

You have won an Advanced Grant by the European Research Council (ERC), which is worth more than 3,5 mill. Euros. You held the key note of this conference. What is the topic of your research?

Prof. Paschereit: My general research focus is on clean and sustainable energy conversion systems like ultra low emission gas turbines, wind turbines and heating systems. This covers advanced flow control methods influencing vehicle aerodynamics so that drag of cars, trucks and trains is reduced and thus energy demand and emissions can be lowered. Within the ERC Grant these goals are extended by working on a new gas turbine technology that promises a significant improvement in efficiency and emissions and provides the ability to burn hydrogen-rich fuels using massive amounts of steam within the cycle.

What attracted you to Kazan? Do you want to spend your grant on cooperation with Russia?

Prof. Paschereit: To be honest, I had never heard about Kazan before I got the invitation from the German Science Foundation. Reading more it turned out that Kazan is actually a very interesting place combining orient and occident, displaying world heritage architecture and having very interesting Universities. Within the ERC Advanced Grant Research I do indeed cooperate with other Institutes to supplement our competences. Talking to the different institutions during my visit in Kazan it appeared that unfortunately there seems to be nobody working in the same field as I do.

You have a long experience in international cooperation. Did you notice any difference between the young Russian and German researchers you met in Kazan?

Prof. Paschereit: Young scientists in all countries, especially the very good ones, are always enthusiastic and curious to learn things. An attitude that I like a lot and that contributes making my work as a Professor so interesting. That was my impression from the young Russian scientists: They were highly motivated and eager to learn and to understand. Spending two hours with the young researchers in a pub was the perfect end of a very interesting week before my departure to Germany. Beside the differences in the culture, which must be there and make life exciting, the interests of the young researchers were very similar.

Nanoscopic Materials for Energy Conversion and Medical Applications

The chances and risks related to nanoscopic materials are reviewed. Such novel materials in the size regime below 100 nm often make use of size dependent properties of matter, which are different from the molecular constituents and macroscopic condensed matter. Fundamental research is required to explore such size effects, which are the required foundation for understanding and optimizing the unique properties of novel nanomaterials. Specific emphasis is put on promising applications of nanomaterials in energy conversion as well as medical nanodiagnostics and nanotherapy without ignoring possible risks and hazards of man-made nanosystems.

SENIOR SCIENTISTS

Prof. Dr. Eckart Rühl

Chair of Physical and Theoretical Chemistry,
Institute of Chemistry and Biochemistry,
Freie Universität Berlin

Since 1996 **Eckart Rühl** has held professorships at the universities of Mainz, Osnabrück and Würzburg. In 2006 he was offered the Chair of Physical and Theoretical Chemistry at Freie Universität Berlin. Since 2010 he has coordinated the German-Russian Interdisciplinary Science Center for Excellence (G-RISC) at Freie Universität Berlin and St. Petersburg State University, which is mainly funded by the German Academic Exchange Service (DAAD). He has published extensively in peer review journals, e.g. "Nature Physics" (2011). Since 2008 he has been working as an elected peer reviewer (Fachkollegiat) of the Deutsche Forschungsgemeinschaft (DFG) in the review board of Physical Chemistry of Molecules and Liquids.

You are head of G-RISC, the German-Russian Interdisciplinary Science Center, which is based at St. Petersburg State University and Freie Universität Berlin. What is the aim of this bilateral centre?

Prof. Rühl: Let me just summarize briefly the key points why G-RISC was founded about two years ago: G-RISC is the German-Russian Interdisciplinary Science Center. It is a Center of Excellence, which is funded by the German Academic Exchange Service (DAAD) and the German Foreign Office. It is a multidisciplinary platform for German-Russian collaborations on modern and interdisciplinary research and education. It covers the important areas of natural sciences with preference to physics, geophysics, physical chemistry, and mathematics. G-RISC specifically aims to tackle important problems, which require interdisciplinary collaborations. G-RISC brings together the key competences from leading universities and research laboratories in Russia and Germany, where promoting the young generation is focus of G-RISC. It is also aimed to create stimulating educational programs by exchanging professors and students, which also includes exploring new avenues of teaching by using electronic media as well as traditional conferences and workshops in order to overcome disciplinary, cultural, and language barriers.

Why did you choose Russia as your target country for G-RISC, and did you look out for partners in Kazan?

Prof. Rühl: Russia is an obvious choice for Germans who aim at close collaborations in natural sciences, which goes far beyond the well-known common roots in the history of both countries. Most important for G-RISC is that we were able to build on several active research and educational networks, which have a long and productive track record. New was our approach to link these networks together in order to overcome disciplinary barriers, which permits to significantly intensify German-Russian collaborations. This is needed, since numerous outstanding problems in science require the expertise from various disciplines. Examples are e.g. found in nanoscience and its applications to material research, technology, and medical research as well as in environmental research. Such complex research fields can only advance well, if the level of disciplinary competence of both partners is sufficiently high and if there is an interest in interdisciplinary collaborations. Clearly, the solid foundation for working together in G-RISC is that the level of education in both countries is excellent. G-RISC can even go beyond, by providing new ideas in research and education for both sides.
Certainly, I did look for partners in Kazan. We were able to start a collaboration on a bilateral level right at the conference, which has been active since then. Kazan Federal University has an excellent reputation, but so far there are no projects funded by G-RISC. I noticed that there is quite some interest from Kazan Federal University to participate in our Center of Excellence. This is easily possible because of the open and federal structure of G-RISC, where every six months the best proposals are selected for funding. I do hope that the next call for proposals already changes the present situation, so that Kazan Federal University will become an active part of G-RISC.

You have chaired a panel in Kazan. What are your recommendations to the young researchers who plan a scientific career?

Prof. Rühl: There are some important issues to recommend to young people. In my view, the most important one is to follow one's fascination for research with sufficient persistence and

dedication. This is the key for self-motivation, especially when the work does not proceed as expected. It is also of importance to know more than the laboratory at the home university or home research institution. It is important to widen the scientific and personal horizon by starting new research directions when going abroad into a different cultural environment. This is a key experience which cannot be gained at home. G-RISC contributes to this important need by permitting young people to go for a couple of months abroad and to build up their own experiences and a networks for their future collaborations.

SENIOR SCIENTISTS

Prof. Dr Kev Salikhov

Zavoisky Physical-Technical Institute
Kazan Scientific Center of Russian Academy of Sciences

Academician Salikhov is director of the renowned Zavoisky Institute and Vice President of the Academy of Science of the Republic of Tatarstan. He graduated from the faculty of physics and has been Chair of Chemical Physics at the Kazan State University since 1989. He was honoured with a number of Russian and international scientific awards, amongst others with the International Zavoisky Award and Alexander von Humboldt Award. He has practised a long time cooperation with Germany and is the President of the Kazan Alumni Club of the Alexander von Humboldt Foundation at present.

You are the director of the renowned Zavoisky Institute in Kazan. What are the research priorities of your institute? In which fields do you collaborate with Germany?

Prof. Salikhov: Our institute gives high priority to both research and education. Zavoisky Institute constantly works with young talents, and there is a system for training students to become researchers. In 1989, the faculty of chemical physics was opened at Kazan Federal University. Many leading researchers are involved in the teaching activities in the faculty, which opens new academic horizons for the students.

Research directions in its turn are:
- Fabrication and investigation of advanced materials promising for spintronics, optoelectronics, quantum computing and information;
- Magnetic resonance spectroscopy with an emphasis on electron paramagnetic resonance.

We follow a close cooperation with our colleagues from Germany in these fields.

You are the President of the Kazan Alumni Club of the Alexander-von-Humboldt-Foundation. What is the major aim of your club? How many scientists belong to this club? With whom and in which fields do they cooperate with Germany?

Prof. Salikhov: There are 14 members of the club with me being one of them. The central aim of our club is twofold: on the one hand, we have in mind that more researchers get a Humboldt grant and on the other hand, we

try to do our best to ensure that upon their return Humboldtians get their positions. In general we aim at contributing to the development of scientific contacts between Russia and Germany and providing information about exchange programmes of the Humboldt Foundation. We also try hard to promote the best practices of foreign educational institutions acquired in the course of academic exchange programs and try facilitating smooth cooperation between the participants of the exchange programs.

You are the Vice-President of the Tatarstan Academy of Sciences. What are the research priorities in your academy? What would you recommend the young researchers from the week who want to stay in science?

Prof. Salikhov: The Academy of Sciences of the Republic of Tatarstan coordinates diverse research activities in our republic. One of the main priorities is the development of humanitarian sciences oriented to the history of Tatarstan, Tatar language, etc. Speaking about young researchers – I would recommend them to enjoy their work!

Cornerstones of a Sustainable Climate Change Policy

Global greenhouse gases (GHG) are on the rise. Although many countries committed themselves to reduce their GHG emissions only a few achieved significant results. Germany not only is a pioneer country in climate policy, but also a champion in emission reduction. This does not go without conflicts and costs. However, the vast majority of Germans would support an even more demanding climate policy. The main reasons and incentives for this attitude are manifold: broad acceptance of research findings on increasing climate change risks; fossil fuel combustion as the main cause; safer energy supply by switching to renewables; long-term profits from exporting "green technology" made in Germany; moral notions of fair burden-sharing in global climate policy; large network of proponents in all spheres of society pushing for a demanding climate policy. But a closer look into the black-box of incentives and driving forces gives good reason to doubt the stability and resilience of these factors once global pressure for more monetary and technological support increases. And if at the same time the existing regressive (and unsocial) distributional effects of most climate policies grow more severe, along with big profits for some well-organized groups from partly even ecologically and socially unsound policies as in the bio-agro-fuel and photovoltaic sectors acceptance might crumble. Therefore, these issues and threats need much more attention than the mainstream in the scientific community, in the political realm and in civil organizations ("NGOs") is willing to give. This may be the chance for young scientists to take a fresh look on issues neglected or even ignored by mainstream paradigms, groups and advocacy coalitions. Rigorous and non-biased research (which still allows for "sceptical sympathy" with its research object) certainly belongs to the cornerstones of a sustainable climate change policy.

SENIOR SCIENTISTS

Dr. habil. Helmut Weidner

Social Science Research Center Berlin

Helmut Weidner is a Senior Research Fellow at the Social Science Research Center Berlin in the research unit "Transnational Conflicts and International Institutions". In 2006 he did his habilitation at Freie Universität Berlin on the Topic "Studies on environmental Instruments: Overview and Critical Analysis." He is a specialist in climate change policy and has carried out extensive research in cross-cultural analysis. In 2008 he was visiting professor at the Graduate School of Environmental Studies at Nagoya University, Japan.

You have been active in climate policy for many years by now. Can such an interdisciplinary week lead to new approaches?

Dr Weidner: Yes, however, it will depend on the kind of interdisciplinarity (adequate balance of social, economic and so-called hard sciences) and a certain input (including incentives) by the organizers.

Kazan was your first trip ever to Russia. Why only now - and what is even more important - was it worth it?

Dr Weidner: My geographical specialization is already rather broad: Western Europe, Japan, and USA: My research interest in Russia grew due to its important role in global climate policy. The conference in Kazan provided an excellent opportunity to get first-hand information and to make research contacts.

You are an experienced university teacher. What was the level of discussions among the young scientists?

Dr Weidner: The discussion level was generally rather high (as in many other universities I know). I wished the social, historical, political and economic context of the research issues would have played a stronger role in the discussions.

SENIOR SCIENTISTS

Prof. Dr. Ilgiz Garifullin

Zavoisky Physical-Technical Institute,
Kazan Scientific Center of Russian Academy of Sciences

Professor Garifullin graduated from the Moscow Engineering-Physical Institute in 1970. Since then he has worked at the Zavoisky Physical-Technical Institute in Kazan, first as head of laboratory from 1983 to 1987 and then as Senior Research Fellow. He did his habilitation in 1991 and got his professorship in 1995. In 2007 Professor Garifullin won the State Price on Science and Technology of the Republic of Tatarstan.

Potentials of spintronics in the development of energy conservation technologies

Everybody knows that our activity in all spheres produces carbon dioxide in the atmosphere. Despite its relatively small concentration in the atmosphere, CO2 is an important component of Earth's atmosphere because it absorbs and emits infrared radiation. Carbon dioxide causes global warming and climate change. This means that in order to be alive we should permanently think how to decrease the carbon dioxide production in the Earth's atmosphere. The carbon dioxide production increases nearly exponentially from year-to-year. In turn starting from 1980 more and more parts of energy consumption relates to computers and Internet maintaining. Estimates for the Internet's use of electricity is about to 10% of all electricity used in the US. Then a brief history of transistors will be given as well as introduction to spintronics. The first major step in spintronics was the discovery of the giant magnetoresistance effect in 1988. Working independently, Peter Grünberg in Germany and Albert Fert in France found that in a material consisting of alternating layers of magnetic and nonmagnetic atoms a small change in a magnetic field can produce a large change in electrical resistance. Simplified physics of normal spin valve operation will be given. In the main part of the lecture the superconductor/ferromagnet proximity effect together with own experiments on the superconducting spin valve will be presented. Finally, some advice for saving electricity using the normal computers will be formulated. groups and advocacy coalitions. Rigorous and non-biased research (which still allows for "sceptical sympathy" with its research object) certainly belongs to the cornerstones of a sustainable climate change policy.

You are a physicist. What are the main future energy conservation technologies in your field?

Prof. Garifullin: I am trying to develop new elements for spintronics which will use the spins of electrons instead of their charge in memory chips. Traditional memory chips need to move electrons around - pushed by electricity which generates heat requiring cooling which uses further electricity. Changing the spin of an electron (from spin up to spin down or vice versa) uses less power and generates much less heat. Spintronics memory chips can therefore have electrons packed much closer together than in traditional chips since overheating will not be an issue giving us smaller chips using less power and storing more data. Spintronics memory chips use zero power to retain data unlike traditional memory chips since electrons will retain their spin orientation when the magnetic field which set it is not present. Therefore spintronics memory chips do not need in power to save the data, but until now this is just theoretical.

Does your Zavoisky Physical-Technical Institute collaborate with Germany?

Prof. Garifullin: It's hard to speak on behalf of the whole institute, but my personal cooperation with Germany has worked out very well. I have started such a cooperation in the frame of a German-Russian Exchange Program funded by DFG initiated by Professor Sigfrid Metfessel in the 1970ies (or may be even earlier) and continued by Professor Hartmut Zabel in the 1990ies. Then I have had a fruitful and productive long term collaboration on a number of projects: Exchange interactions in magnetic superlattices with normal and superconducting spacer layers (since 1994) and Proximity effect in superconductor/ferromagnet heterostructures (since 2000). In both projects the principal investigator from the Russian side was me and from the German side - Prof. H. Zabel. Now my group is working together with IFW Institute in Dresden with the group of Professor Bernd Büchner. Recently we could complete a joint project on magnetic resonance supported by the DFG (Magnetic resonance study of nanoscale quantum magnets) which was also extremely fruitful and productive.

This was the first week of its kind. What did you think of this German initiative?

Prof. Garifullin: I think it was a great initiative. Moreover I'm sure it should be regular. My young Russian colleagues would like to participate in such weeks every few years both in Germany and in Russia. For young researchers it was a very valuable experience in the academic carrier. They learn to make presentations in front of an international audience, they get to know their colleagues from abroad and have a good chance to establish new contacts. Let alone the fact that significance of international cooperation in research will consistently grow.

From Functional Polymers towards Organic Solar Cells

The talk will give a short overview of the work which is performed at my chair for "Structure and Properties of Polymeric Materials" at the University of Stuttgart. Beginning with an introduction into polymer science with the focus on semiconducting polymers with optoelectronic properties, potential applications in polymer electronics (organic solar cells, organic transistors) will be presented. As recent research highlights there is a publication about the controlled crystallization of poly(3-hexyl thiophene) in thin films and the anisotropic charge transport along specific crystallographic directions.

SENIOR SCIENTISTS

Prof. Dr. Sabine Ludwigs

Chair of Structure and Properties of Polymer Materials,
Institute of Polymer Chemistry (IPOC)
University of Stuttgart

Since 2010 Professor Ludwigs has held the Chair of Structure and Properties of Polymer Materials at the Institute of Polymer Chemistry at Stuttgart University. She did her PhD in Bayreuth and worked as a Postdoc in Cambridge, UK. In 2008 she became leader of an independent junior research group within the Emmy-Noether-Programme of the Deutsche Forschungsgemeinschaft (DFG). She was Junior Fellow at FRIAS (Freiburg Institute for Advanced Studies) and did her habilitation in Macromolecular Chemistry in Freiburg. Between 2007 and 2011 she was regularly invited as professor by the Université Louis Pasteur, Strasbourg.

You are a young and promising polymer chemist. What is the scientific link to the topic of the week?

Prof. Ludwigs: The topic "Man and Energy" is strongly related to my work. In my interdisciplinary research team of physical and macromolecular chemists at the Institute of Polymer Chemistry at the University of Stuttgart we are working on the synthesis and the morphological and electrochemical characterization of novel tailor-made functional polymers. We are particularly interested in so-called optoelectronic polymers which can be applied in energy harvesting processes, such as organic photovoltaics.

What was your general impression of Kazan? Will you come back to Russia after your first visit?

Prof. Ludwigs: I will definitely come back to Russia, a scientific and cultural visit to Moscow is planned, since some experts in the field of polymer physics are working at Moscow State University. In particular the sightseeing visit of the Kazan Kremlin was very impressive.

You brought two of your PhD students to Kazan. What did you think of the quality of the presentations of the young scientists?

Prof. Ludwigs: The overall quality of the talks of the young scientists was very high. In general it is quite challenging for young researchers to present their research projects to such an interdisciplinary audience. A number of highly interesting and fruitful discussions followed the talks. The first Russian-German Week of the Young Researcher was indeed a very good idea which successfully brought together Russian and German young scientists from different fields.

SENIOR SCIENTISTS

Prof. Dr. Nail Sakhibullin

Astronomical Department, Federal University of Kazan,

Academy of Sciences of Republic of Tatarstan

Professor Sakhibullin is Scientific Secretary of the Branch of Physics, Energetics and Earth Sciences of the Academy of Sciences of the Republic of Tatarstan. He did his habilitation in Leningrad in 1987. He is known for creating the Kazan astrophysical scientific school and is head of the Astronomical Department at the Federal University of Kazan. Professor Sakhibullin is elected member of the International Astronomic Union and the Eurasian Astronomic Society.

What we know about Energetic in Cosmic Space

Present achievements in technology allow to investigate astronomical objects in a full spectral region (from gamma to radio wavelengths), to determine flux radiation and position of these objects with the highest accuracy. As a result astronomers have discovered a lot of new galactic and extragalactic sources with extremely high energy output. In many cases the nature of this high radiation is not yet explained. Without doubt the theory will be developed in a short time, and hopefully some cosmic energy may be used for alternative sources of energy.

What is your specific interest in energy research?

Prof. Sakhibullin: The search for alternative energy has benefitted from astronomical researches. There is a wide range of new objects found by modern astrophysicists which have huge energy potential. Understanding the mechanisms of this energy production will allow to find new alternative sources of energy in the future. The multidisciplinary approach to energy we had at the conference will contribute to solve this question.

Do you or your colleagues work together with Germany?

Prof. Sakhibullin: International collaboration plays a huge role in our activities. I started cooperating with foreign academics back in the 1970s when I was doing an internship in the Dutch city of Utrecht, where I wrote my thesis. Then I had the chance to start research activities in the US, at the Joint Institute for Laboratory Astrophysics, Colorado. Collaboration with Turkey is also worth mentioning. Currently I work with the Max Planck Institute for Astrophysics in Germany. Its director Rashid Sunyaev is my long-term partner. We perform investigations of cosmic gamma-bursts based on space satellite and ground observations. One of my scholars is working at the Astronomical Institute in Tübingen. And another one is collaborating with colleagues of the Munich Astronomical Observatory.

What were reactions in Kazan to this event?

Prof. Sakhibullin: Fully positive! Attention to young scientists is always a priority for our university. We should get them more actively involved into joint projects, we need a system that would allow us to discover and support young talents continuously. Therefore events like this "Week of the young scientist" are of great importance.

Micro Energy Harvesting

The presentation deals with recent research results in the field of energy harvesting. Energy harvesting is an upcoming technology that aims to harvest power from the surrounding in terms of heat, light or vibration. This energy is used to power small sensor nodes that are coupled by RF-communication. These sensor nodes may be used in locations where powering the sensors by batteries or a power grid would lead to high installation or maintenance cost. Furthermore the Research Training Group, a program of the German Science Foundation that allows young researchers from all over the world to earn their doctorates in Germany, is presented.

SENIOR SCIENTISTS

Dr. Frank Goldschmidtböing

Chair of Design of Microsystems,

Department of Microsystems Engineering (IMTEK),

University of Freiburg

You are a qualified engineer by training. What is the connection between microsystem technologies and energy?

Dr. Goldschmidtböing: Microsystems technology deals with small device of micrometer to millimeter size. Therefore we cannot produce huge amount of energy. Our approach is to make large energy producing or consuming facilities more efficient by using information from self-sufficient autonomous sensor networks. These sensor networks are made of small microsystem sensor nodes that do not need any power grid or battery replacement because they harvest energy from the environment in terms of heat light or vibration.

What expectations did you come to Kazan with – and how did they turn out for you after your first stay in Russia?

Dr. Goldschmidtböing: I was curious because I have never been in Russia before. I met many friendly and ambitious young researchers. I enjoyed my stay.

What did you think of the topic and the format of the week? Can we do better next year?

Dr. Goldschmidtböing: The topic was very broad. We had presentations from many disciplines, from politics to engineering. This made the interdisciplinary workshop very interesting to me. Nevertheless I believe that a more focused discussion by researchers from one discipline could lead to a real collaboration. Maybe a compromise would be perfect: Plenary sessions with basic presentations from all scientific fields and more focused engineering and social science sessions.

Frank Goldschmidtböing graduated from RWTH Aachen University and worked at Technical University Munich in the field of microfluidics. He coordinated projects at the Fraunhofer Institute for Solid-State Technology (IFT), which became the Fraunhofer Institute for Microelectronic Circuits and Systems (IMS). Since 2005 he has been head of the group of "Microfluidics and Micromedicine" at IMTEK. He won an innovation award from the German Ministry of Education and Research (BMBF) and is a laureate of the Knapp Award of the American Society of Mechanical Engineers (ASME). He has associated with the Research Training Group GRK 1322 "Micro Energy Harvesting", which has been funded by the Deutsche Forschungsgemeinschaft (DFG) at the University of Freiburg since 2006.

JUNIOR SCIENTISTS

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Analysis of load-center supply systems for peripheral districts of big cities

A distinguishing feature of the modern society development is a constant growth of a number of big cities and their population, as well as the development of the power supply of both utilities and industrial area. Such a development of cities and utilities goes along with the significant growth of power consumption which requires new power sources.

It's obvious that it's quite a problem to build new power plants within the cities. It is also impossible to transmit the required amount of electrical power from the remote sources to consumers through 10-20 kV distribution grid. That's why it's essential to foresee the construction of power sources such as the high voltage load-center supply systems (LCSS). This fact leads to the necessity of researching the efficient construction of LCSS as well as defining and calculating their parameters.

In the precedent researches mainly LCSSs involved into city centers were examined. But under the modern conditions of expansion of the cities' territories the construction of LCSSs in new peripheral districts located not far from the external power sources becomes more actual.

In this case it is more reasonable to supply the part of consumers directly from the external power source through the medium voltage grid. That's why a new topology model of a power supply system was designed for big city districts receiving power supply from both an external power source and a radial load-center line. (fig.1)

Fig.1.The topological model of the power supply system of the peripheral district of the big city from an external power source and a radial load-center system

LCS – load-center substation, LCL – load center line, DLMV – medium voltage dual-circuit transmission line, a,b – dimensions of a district, LPS – distance from the power source to the boundary of the part supplied from LCS, l_{LCS} – distance between LCS and the boundary of the part supplied from LCS.

While defining the optimal parameters of load-center supply systems in this research, the optimum criteria was taken the minimum of discounted costs $C_{d\Sigma}$ and the following technical and economical models were considered:

- medium and high voltage switchyards of power sources as circuit breakers - C_{PS};
- load-center supply systems as load-center lines C_{LCL} and load-center substations C_{LCS};
- medium voltage grid supplied from both power source C_{mvPC} and load-center substation C_{mvLCS}:

$$C_{d\Sigma} = C_{PS} + C_{LCL} + C_{LCS} + C_{mvPC} + C_{mvLCS} .$$

As a result of optimization of parameters of load-center supply systems the following results were obtained:

1. For the districts of 10 to 20 sq. km area and load density from 20 to 50 MVA/sq. km it is reasonable to locate LCS at a distance of 50-65 % of district's length.
2. The optimal location of LCS from the boundary of the supplied part is 5 to 30% of the parts' length.

Superconductivity on the men service: ideas, problems and current progress

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JUNIOR SCIENTISTS

Superconductivity was discovered by Onnes in 1911 in Leiden. Beside the lossless propagation of the electric current, superconductors exhibit another phenomenon: the expulsion of the magnetic field from the bulk of the material, a so-called Meissner effect. The lossless propagation of the electrical current in superconductors is already used for creation of strong magnetic fields, which is needed for the magnetic resonance imaging (MRI), a method of diagnosis in medicine. It is widely exploited in science for creation of strong magnetic fields as well as for the production of sensitive magnetometers based on superconducting quantum interference device (SQUID), and for production of particles detectors. In addition, one could think of using the lossless propagation of the electrical current for saving the electrical energy. Superconductors could play a role of a material for producing the low-loss power cables or the windings of motors and generators. The second property, which is the expulsion of the magnetic field, could make the frictionless transportation possible since it leads to the levitation of the superconductor above the magnet. Unfortunately, there are many complications in the application of the superconductors so far. The main issue deals with the need for low temperatures of approximately -140o C. Moreover, the high temperature superconducting materials are quite unstable, it is very difficult to make wires, since most of them are ceramics, and the cost of their preparation is quite high. To overcome all this complications, there is a need for fundamental researches, which enable the investigation of new materials with desired properties. In our research we investigate a novel high-temperature Fe-based superconductor and address an intriguing issue of coexistence of two conflicting phenomena - magnetism and superconductivity - in the same material.

New wall blocks of volumetric pressing and effective technology of its production

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Annually for heating of buildings Russia expends 240 million tons of conventional fuel, which comes to about 20% of general expenditure of the resources of energy in the country. At present the losses of energy deal with 20-25 % of energy granted for the needs of consumers what correspond to 60 million ton of conventional fuel per year.
In this context one of the most important issues is associated with high-quality and reliable thermal protection of buildings which ensures care of energy and resources, raises comfort of stay, and reduces environmental pollution.

The most perspective building external enclosure are multilayer products with implementation of effective heat insulators together with layers bearing. This method is being used in the developed countries.

The object of this research work is to work out three layer wall blocks with increased physical and technical properties as well as energy-effective technology of its accelerated production based on the self-consolidation effect by making use of polystyrene inner potential opportunities in the course of the thermal processing.

The researches resulted in working out of layer-monolithic goods with transition zone and a technology of its production based on the volumetric pressing method. The essence of the technology deals with the following stages. In the hard perforated form, specially worked out, three layers were laid– exteriors made from haydite concrete and the middle layer made with concrete with cellular polystyrene (preliminary made foam polystyrene). Then the lid was put on the form and the mass underwent an electric heating over the metal electrodes situated on the two opposite sides of the form for 20-25 min. At a temperature higher than 80 degrees the polystyrene finally made foam, increasing by volume, and created inner excessive pressure up to 0.3-0.4 MPa.

In the course of the volumetric pressure a complex influence on forming masses by energy of the hydrothermal power field was observed; the result of a so-called mutual penetration of layers was obtained; wringing out of free moisture over the perforation took place, getting the values which are close to the parameters theoretically necessary for the hydratation of binding materials. More solid structure of concrete was created. The acceleration of its thermal processing took place. After the electric heating of the article it was kept in the form up to 50 minutes for the relaxation of the inner strains and for picking up the structural stability. Then the demoulding of the form took place and the goods were heated up to the temperature of 90 degrees with their further placement onto the underpan for a final thermal processing. That circumstance enables to liquidate the stage of mass heating and start thermal processing of goods with 5 open edges from the isothermal stage, accelerating the process and decreasing the time of thermal processing, thus cutting the expenditure of the energy resources for it realization.

The cycle of forming and thermal processing of the goods takes about 7 hours, although the cycle of analogous casting technology reaches up to 15 hours.
The consolidation of concrete on the joint of two layers of the block triggered the creation of the variable field of pressures provoked by the difference in degrees of the foaming of different fractions of polystyrene. This circumstance enabled to develop a specific surface of contiguity of the layers, which contributed to solid coupling of layers and well joint work of the monolyth. Besides, a mutual penetration of layers took place. And so in the same technological manner the consolidation took place and created the transition zone, contributing to better work of the article due to reduction of temperature tensions arising at the border lines of layers in three-layer goods in the exploitation.

In the course of the self-consolidation the middle layer experienced the formation of the structure with double carcass – mineral and polymeric - due to coagulation of the cellular polystyrene kernels.
The implementation of the suggested technology allows avoiding the concrete-mix vibration and by comparatively low pressure, which is created inside the mass, obtaining even density and strength over the whole volume of article, which are unachievable by its forming with the concrete-mixture vibration. And also the ability of self-consolidating masses to wring out the excessive water over the form perforations opens the opportunity to use plastic mix, enabling to fill the form with mass for monolithic constructions without a need to use the forced means. The available opportunity to obtain the goods of the slotcomb construction makes the reduction of thermal losses possible due to the decrease of the cold bridges and facilitates the process of the blocks assembling. The creation of transition zone excludes the sharp alteration of vapor-penetration means of the next layers and hinders generation of great amounts of the condensate.

The research has been carried out within the framework of the federal aim programme "The Dwelling", the state programme "Own house", and the priority programme on the development of science, technologies and technique in Russia Federation "The Energetics and Energy Efficiency".

Analysis and Modeling of Combustion Instabilities

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In transportation and industrial energy conversion processes gas turbines play an important role because of their robustness and operability. Since most renewable energy sources are very volatile in the output, power plants are needed.

Since the emission restrictions for industry and transportation have become stricter gas turbine manufacturers are faced with a challenging task.
These restrictions led to the implementation of lean premixed combustion in modern low-emission gas turbines in the 1980s. Lean premixed combustion means that huge amounts of excess air is incorporated in the combustion and thus the flame temperature is lowered. Additionally the fuel is mixed with the air well upstream of the combustion chamber to avoid regions of higher or lower fuel/air ratio.

Unfortunately, this combustion technique is more susceptible to thermoacoustic instabilities which can result in less stable operability, higher emissions, lower efficiency and machine failure.
One possible way to avoid thermoacoustic instabilities is to assess the stability of the flame in a single burner combustion test rig using one-dimensional acoustic network models. In these models every component of the combustion system is treated as an acoustic four pole (i.e. transfer matrix), which connects the acoustic field up- and downstream of the element. These elements have to be modelled or measured to create the system matrix, a mathematical description of the whole combustion system.

Several ways to measure the required transfer matrices exist.

The acoustic multi-microphone method allows resolving the whole acoustic field up- and downstream of the flame. Hence the complete combustion matrix is measured and therefore the multi-microphone method can be considered as the most accurate technique available. Unfortunately, this method requires arrays of multiple microphones up- and downstream of the investigated element. Since this space is often not available in intermediate- or high-pressure test rigs, other ways to measure the flame transfer matrix are needed.

One promising way to measure the flame transfer function, is to measure the heat release rate of the flame by collecting the chemiluminescence signals of the reactants. In the present study a new measurement technique for liquid fuels employing multiple optical species is developed. It is based on a calibration measurement from which an empirical correlation between the heat release ratio and the chemiluminescence intensities can be derived.

Using this correlation it is possible to derive the flame transfer function of liquid fuels by only collecting the velocity fluctuations upstream of the flame and the chemiluminescence intensities of the flame. In addition this method separates the different contributions to the heat release rate fluctuations.
Detailed knowledge on the acoustical characteristics is one of the key factors to develop modern low emission gas turbines and therefore is an important step for more efficient energy conversion.

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Thin block copolymer films for applications in organic solar cells

The keystone of organic solar cells to be optimized for efficient conversion of light into electric power is associated with the photoactive layer. The photoactive layer of an organic solar cell consists of a donor material (which is normally a polymeric material such as poly(3-hexylthiophene), P3HT or poly (para-phenylenevinylene), PPV) and an acceptor material which could be a C60 derivate or an inorganic compound such as for example ZnO. By irradiation of the photoactive layer an exciton, which is a bound electron-hole pair, is generated. Within its free diffusion length (~ 10 nm), this exciton has to reach a donor-acceptor interface since only at this interface separation into free electrons and holes can occur. Furthermore, continuous pathways are needed to both electrodes.

Block copolymers showing phase separation in the range of ~ 10 nm and a variety of different morphologies are promising materials for fine-tune interfaces between the donor and the acceptor phase in the photoactive layer of organic solar cells. Beyond the approach of using block copolymers consisting of two functional blocks (donor-b-acceptor), which often faces synthetic problems, using polymers consisting of one functional block and one non-functional but functionalizable block is a promising route. Thin block copolymer films serving as model system for the photoactive layer in the tailored device are well suited to investigate the phase separation of these complex block copolymer systems. With different methods such as controlled solvent vapour treatment or thermal annealing the morphology of these systems can be adjusted and manipulated.

Within my talk I will present our approach of using block copolymer systems consisting of one functional, crystallizable stiff donor block, either P3HT or DEH-PPV, and one non-functional flexible (coil-like) block, i.e. poly(lactic acid) or poly(4-vinylpyridine). The interplay between the donor block tendency to crystallize and the rod-coil attempt of phase separation enables control of structure formation of these systems in thin films. With various annealing methods assisting block copolymer self-assembly, fine-tuning of the interfaces and control over the thin film morphology are possible. Furthermore, results showing functionalization of the non functional block with an acceptor component in situ or after adjustment of the morphology in order to yield promising material combinations for use in more efficient organic solar cells will be presented.

Control and Suppression of Combustion Instabilities

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Stationary gas turbines play a very important role in the production of electrical energy in many countries of the world. The newest combined-cycle gas turbines feature electrical efficiencies up to 60%. Due to their very short start-up time, gas turbines are often used to support the production of electrical energy by natural energy sources including wind turbines or solar power plants. However, gas turbines are emitting toxic NOx emissions, which are regulated strictly in most countries of the world. To satisfy these regulations, modern gas turbine manufacturers mostly rely on lean premixed combustion. Unfortunately, lean premixed combustion is prone to thermoacoustic instabilities. Thermoacoustic instabilities can increase the emissions or even destroy parts of the engine. In general, instabilities result in reduced gas turbine efficiency since the turbine can not be operated at the ideal operation point. Two different approaches to suppress thermoacoustic instabilities are known.

Passive control suppresses oscillations by increasing the damping of the unstable modes using, for example, perforated plates or Helmholtz dampers. These strategies are successfully applied in full-scale engines; however, a strong disadvantage is that they tend to damp only a small frequency range. To prevent thermal destruction, these devices are usually cooled by a purging flow. High purging flows are implicating several disadvantages. First of all, purging flows are per se reducing the cycle efficiency of the gas turbine since they are increasing the amount of air that is loss tainted passed through the machine without contributing to the net power outlet. Secondly, the purging flow increases the acoustic dissipation through vortices and thereby reduces the damping efficiency of the Helmholtz resonator. Since the acoustic velocity inside the neck of the resonator becomes already very high at moderate pressure levels, hot gas penetration can not be fully avoided. The presented study extends a well known model to include the influence of hot gas intrusion on the impedance of the resonator. The density of the acoustic volume flow is modeled using mean values averaged over one oscillation period. Furthermore, it is assumed that the cold purging flow is convected away from the resonator and consequently only hot gas is sucked in. The resulting model predicts a significant shift in the resonance frequency of the damper towards higher frequencies. Subsequently the model is verified by an experimental investigation for two hot gas temperatures and resonance frequencies. By fitting the non-linear loss-factor of the model at two specific amplitude levels, a good agreement between the model and the experimental data was obtained for all levels of amplitudes and hot gas penetration. The experimental data indicates that the model assumptions are reasonable since they are in good agreement to model results.

The main idea of active control is to use external forcing such as acoustic excitation or fuel flow modulation, to attenuate the instability. Active control can be categorized as closed- or open-loop. A closed-loop controller needs by definition at least one sensor signal to drive the actuator and close the feedback loop. This control technique is well known and was already implemented in a heavy duty gas turbine. However, currently no machines are running, using active control, since the actuator technology is expensive and not reliable enough. In contrast to that, the control signal of an open-loop controller is determined only by the operator and therefore independent of the system state. Besides the inability of such a controller to adapt to changes in the system dynamics, it usually also provides a lower efficiency. However, open-loop control is much easier to implement into a combustor, since neither a dynamic sensor signal nor a signal processor is required. The underlying mechanism of open-loop control is difficult to understand because it is inherently nonlinear. A new aspect of understanding this nonlinear phenomenon was provided by the theoretical considerations based on an elementary model system. It interprets open-loop control by forcing at non-resonant frequencies in terms of the

flame's nonlinear response to a superposition of two approximately sinusoidal input signals. For a saturation-type nonlinearity, which can be assumed as the case for a premixed flame, the fundamental gain at one frequency can be decreased by increasing the amplitude of a secondary frequency component in the input signal. Since this mechanism is independent of the system acoustics, an assessment of favorable forcing parameters, which stabilize thermoacoustic oscillations, may be based solely on an investigation of burner and flame.
Active and passive controls are key-technologies for a stable lean combustion, which ensures high efficiency and low-emission production of electrical energy.

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The usage of an alternative energy source – wind generator at retail establishments of LLC "Tatneft"

Work actuality. Nowadays when all perspective companies set the goal to reduce process costs, achieve high profitability from invested means, and reduce harmful influence on the environment, innovative engineering solutions begin to dominate. The meaning of these solutions is in achievement of the above-stated goals. In this work we've examined the reduction of operating costs at the retail establishments (service stations) of LLC "Tatneft". The reduction of operating costs is examined on the example of reduction of electric power pay; the cost of electric power is constantly increasing. The engineering solution is the installation of wind generators at some service stations for energy production. A wind generator is the instrument for electrical energy independence!

Aim of the work. The reduction of operating costs at service stations, electric power independence of service stations.

Object of the research. The system of factors that provides maximum electric power production by the wind generator.

Subject of the research. The process of interaction of generator elements with the wind.

Scientific novelty of the work:

- the results of experimental investigations which prove the possibility of wind generator installation at some service stations;
- the experimental part was made using the programme set of National Instruments LabVIEW, that allows to fulfill data collection and processing and also the automation of measurements under different experiments.

Practical value of the work.

- possible usage of the wind generator at service station 227 along highway M7, Tuyrlema station, Kozlovsky district, the Chuvash Republic, the Chuvash branch of LLC "Tatneft' – AZS Center" and service station №391, highway M7, Adreevo-Bazary village, Kozlovsky district, the Chuvash Republic, the Chuvash branch of LLC "Tatneft' – AZS Center".
- wind generator, as a part of "green" image of retail establishments of the company, gives the opportunity to increase clients' base as it demonstrates the preference of high innovation techniques with care of ecological safety.

The main components of the system without which the work of wind turbine is impossible are the following:

1. Generator - is necessary to charge accumulator batteries. Time of accumulator charging depends on its power. Generator is necessary for the production of alternating current. Amperage and voltage of a generator depend on the wind speed and stability.
2. Blades – move generator shaft due to kinetic energy of the wind.
3. Mast – usually the taller the mast is, the stronger and more stable the wind strength appears.

The additional components are:

1. Controller – operates many wind generator processes such as blades turn, accumulator charge, protection functions, etc. It transforms alternating current produced by a generator into direct current to charge accumulator batteries.

2. Accumulator batteries – store up electric power to use it in windless hours. Also they even and stabilize output voltage of a generator. Due to them, stable voltage can be received without any interruptions even with gusty wind. The object is charged from accumulators.
3. Anemoscope and sensor of wind direction – are in charge of data collection about wind speed and direction in objects of medium and great power.
4. Average blocking probability (ABP) - automatic switch of power source. It automatically makes switches between several power sources in 0.5 second period if the main source disappears. It allows uniting the wind setting, social electrical transmission network, diesel generator and other power sources in one automated system.
5. Invert circuit – transforms current from direct current stored up in accumulator batteries into alternating current that many electrical devices use.
In this work we examined the solution of the problem of electric power independence at retail establishments of the company, the reduction of process costs to service station maintenance due to the usage of the alternative energy source – wind generator at the concrete service station with rich wind energy. Turning this wind energy to the right direction is the main task of work.
The installation of wind generators at other company's objects is possible. In this work only Kozlovsky district of the Chuvash Republic was examined. It's necessary to make more detailed research in this field in all districts of the Chuvash Republic, to make computer modeling of the process of generator work. Also it should be mentioned that several powerful wind generators have been already installed on high-rise buildings in Mariinsko-Posadsky district –neighboring to Kozlovsky district. These generators are firm, they don't need any care, they can last for a long time and the most important thing is that they are already useful for people transforming one source of energy into another one with minimum costs and without any influence on the environment!

"Multistep" electricity pricing for residential users: A case study of China.

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Over the past 2 decades China's electric power sector – one of the largest and fastest growing in the world – has experienced significant structural changes. Generation has been separated from transmission; there have been carried out several wholesale market experiments; certain industrial consumers have been allowed to purchase electricity directly from power generators. However, China's electricity pricing policy for residential users has remained practically unchanged. Currently tariff for this group of consumers is still regulated by the Government and kept at a relatively low level by means of cross-subsidization. It also remains undifferentiated, so all residential consumers are eligible for discounted prices regardless of their income and total amount of electricity they use. Needless to say that this pricing policy fails to ensure sufficient flow of financial resources to power producers, hinders implementation of market reforms in electricity industry, and creates no incentives for energy conservation in the household sector.
"Multistep" (or multitier) electricity pricing is a new form of billing that is expected to solve most of the above mentioned problems. According to the 12-th five-year plan (2011-2015), China is to carry out a reform in order to divide the existing tariff for residential users into 3 levels (preferential price, regular price and penal price) depending on the amount of electricity consumed. The basic principle of the reform is "The less electricity you use, the less you pay". The aim of the reform is to encourage energy conservation and support the poor by providing them with electricity at a low price, while "punishing" those who do not save energy by making them pay a higher price for extra electricity they use. At the same time the Government encourages adoption of the "time of use tariff" policy in

order to transfer electricity consumption from peak load to valley load through price signals. "Multistep" electricity pricing has already been tested in three Chinese provinces. The results of the experiment, however, show that the reform has certain weak points. For instance, it does not take into account such important factors as seasonality, climate differences between southern and northern regions, differences in the level of income in cities and villages, total amount of residents in a household, as well as electricity consumption for water heating. Today the reform is being revised by the National Development and Reform Commission (NDRC) and is to come into effect until 2015. While this reform alone will not eliminate cross-subsidization and regulation of electricity pricing, it will allow the Chinese Government to gradually raise power tariff for residential users, channel subsidies to the poor, promote energy conservation and possibly predetermine further market reforms in the sector.

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Placement and sizing evaluation of distributed generation in electric power system

My speech will be divided into several sections:

- First of all, I'd like to draw you attention to the definition and scientific challenges, arising when distributed generation (DG) is integrated into distribution networks.
- According to the list of scientific challenges, the problem of optimal siting and sizing of DG was selected for further research. The brief overview of solution methodology will be presented as well.
- The next section will be dedicated to proposed solution methodology considerations.
- Case studies will be provided.
- Finally, key points of my report will be outlined.

In the literature a large number of terms and definitions are used in relation to DG. Most of the definitions are provided by power engineering institutes workgroups. They have much in common, but various government regulations impose significant differences.
In attempt to formulate the most clear and general definition, the following definition is provided: Distributed generation is not centrally dispatched modular generation, located at the distribution level or in the consumption center.
Considering the list of scientific challenges, the problem of optimal siting and sizing of DG in distribution networks was selected for further investigation.
In the literature problem of siting and sizing was solved using different mathematical formulations and solution methodologies.
According to the foreign literature analysis, the solution methods can be divided into two groups:

- The first one representing conventional optimization techniques and analytical approaches.
- The second one representing heuristic approaches.

Such optimization portfolio leaves much to investigate since most of the proposed methodologies require significant simplification of the model or cause significant difficulties in algorithm tuning.
In my research the problem of siting and sizing optimization is solved using the following mathematical formulation. The optimization objective is power loss minimization with respect to bus balance constraints as well as total DG rating, total amount of power generation devices, and voltage constraints. The mathematical model presented was programmed using GAMS software.
An AlphaECP algorithm is proposed for DG siting and sizing problem solution. Extended Cutting Plane algorithm is used for solving quasi-convex Mixed Integer Nonlinear Programming problems. The algorithm approximates the feasible region with linear approximations and solves a sequence of linear problems based on these approximations.
For the purpose of better understanding, the algorithm is demonstrated using integer problem case study. The optimal solution to this problem is y=(2;2). As it can be seen from the figures, several linearizations were added

to the problem to find the global minimum. The optimal point was found on the fourth iteration. However, in order to ensure that the point is optimal, Alpha indices were introduces in mathematical formulation, providing more precise solution.
Formulating the given problem for the estimation of system power losses, power flow calculations are required for each iteration. Power flow equations for radial distribution networks are formulated using well-known graph theory. The incidence matrix and its modifications are used to formulate current Kirchhoff equations and to perform bus voltage calculations for a particular network.
To show the possibility of the proposed algorithm usage in application to siting and sizing of distributed generation, subsequent case studies are provided. In order to verify the proposed algorithm operation, 5-bus test network was taken as a case study. The objective is to select the proper generation output and the connection point for minimum power losses. On the basis of all possible combinations method, objective function surface was obtained. In this case the optimal DG site and size are the 3rd bus and 1.8 MW power output, respectively. Calculations, carried out in GAMS software led to similar results with the objective function value of 17.33 kW. Several simulations results considering single and multiple DG source installation scenarios are provided as well.
The next case study under consideration is a 30-bus test-system. The objective function surfaces are plotted as for the previous case study as well. Several simulations were carried out to determine the optimal site and size of distributed generation. The maximum power loss reduction achieved corresponds to three DG sources scenario with the objective function value 82 kW. It is also clear from the bar diagram, that DG integration can favor voltage profile improvement.
It's obvious that DG may offer an alternative solution of power supply problem. However, comprehensive research is needed to evaluate the overall impact of DG on distribution networks.
The problem of sizing and siting is one of the first to be resolved. In my research it was found out that DG power sources could serve the objective of power loss reduction. It should be mentioned that the entire optimization problem is multi-objective, concerning economic, legislative, ecological and other criteria. In my investigation, the optimization problem formulation was single-objective, giving floor for further research to make a significant contribution in this sphere.

Influence of the electrolyte components on electron kinetics in a dye-sensitized solar cell

Dye-sensitized solar cells (DSSC) offer an alternative to conventional photovoltaic devices. However, the liquid electrolyte present in DSSC still causes considerable problems for large-scale application and production of these devices. In this contribution a (pseudo) solid state DSSC will be presented where a liquid film adsorbed at the TiO2 surface replaces the liquid electrolyte in conventional DSSC. All other components are those of a conventional DSSC. This new structure enables a more reliable and sensitive determination of charge carrier injection and transport by contactless transient photoconductance (TPC) measurements.
The (pseudo) solid state DSSC is characterized by I/V measurements, revealing a solar to current conversion efficiency of 2.4 % at 100 mWcm-2 and of 3.5 % at 10 mWcm-2. TPC measurements of the complete device showed an increase of the TPC (electron) decay rate with increasing voltage applied to the TiO2 electrode. A possible explanation of this effect is the increasing injection of electrons into the front contact with increasing voltage.
The influence of the composition of the electrolyte on charge carrier kinetics was investigated in device subsets without FTO contacts in order to increase the reliability and sensitivity of TPC measurements. A drastic decrease of the electron decay rate was observed with increas-

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ing concentration of the redox couple. This is probably due to charge transfer between the dye cation and the redox couple. The influence of the other electrolyte components is only minor. The replacement of the iodide/iodine redox couple with the kinetically fast ferrocene/ferrocenium system leads to a dramatic increase of the electron decay rate. This gives an additional microscopic background for the higher performance of DSSC employing the iodide/iodine system.

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The contribution of nuclear-resonance spectroscopy to the energy efficiency of mining industry

The nuclear-resonance (NR) spectroscopic methods, such as nuclear quadrupole resonance (NQR), nuclear magnetic resonance (NMR), and nuclear gamma resonance (NGR or Mössbauer effect), have been evolved essentially to the complex studies of crystal-chemical and physical properties of condensed matter with high resolution. Notably, these methods are employed in the investigations of both the bulk compounds and the nano-scaled matter (for example, particles and thin films/layers). The effective implementation of NR tools in industry is based on both the informative and the technical reasons.
On the one hand, all foregoing methods are related in view of their high informativity in spite of their serious technical distinctions. Actually, NR techniques are able to obtain the accurate high resolution spectroscopic data. These can then be interpreted to give structural information which can be related to local electronic structure, order/disorder phenomena, and crystal phase transformations. In addition, internal dynamics (ionic diffusion, metallic behavior, rotations) using the relaxation data can be also studied. These aspects make NR methodics as high-precision tools for search, diagnosis and nondestructive check of different kinds of materials.
On the other hand, the NR spectroscopic methods have the technical advantages for more wide application in industry. The corresponding equipment can be realized in many cases as portable and remote sensors, which are able to make the quality express analysis. As a consequence, these aspects allow one to apply successfully the NR equipment in industry to an increasing extent. In particular, NMR is widely used in oil borehole logging, analysis of the productivity of oil-bearing reservoir rocks, study of the wood moisture. NGR and portative Mössbauer-based equipment is utilized in well-known Mars rovers "Spirit" and "Opportunity" to search and detect the iron-bearing commercial ore. NQR technique is involved as sensors for explosive and illegitimate drugs detection.
NR technique seem to be very perspective for industry (especially, for mining one) for their further implementation according to cost/quality ratio. Actually, as applied to geology, portative NR devices can simplify essentially the mining technique, provide additional information (chemical activity of minerals impurity configurations in ore minerals, occurrence of nano-scaled mineral-indicators), and accelerate diagnostic process. It should lead as a key consequence to improvement of ergonomic features and decrease of power inputs for mining extractive industries.
This report highlights some NR studies in series of copper-sulfide commercial ores of Cu-S, Cu-As(Sb)-S and Cu-Fe-S families. This result demonstrates how NR methods and corresponding equipment can contribute to our possibilities to improve the efficiency of mining ore including the informativity, ergonomic characteristic, and energy efficiency of the processes. Examples are taken both from author's and other research groups studies.

A new Combustion Technology for High-Efficiency, CO2-free Gas Turbines

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Humidified has turbines operating at ultra-wet conditions offer a significant increase in efficiency compared to the dry gas turbine cycle. In single-cycle applications, ultra-wet gas turbines offer efficiencies up to state of the art combined-cycle power plants of 55% - 60%, but with much lower installation costs and emission levels. In contrast to the complex combined-cycle plants, ultra-wet gas turbines have a substantially smaller footprint. With very short start-up times and excellent load control capabilities, they can also be used to compensate for the rapid fluctuations in wind energy. Ultra-wet gas turbines have high fuel flexibility and can be operated on natural gas, hydrogen-rich fuels from biomass or coal gasification, and pure hydrogen, at very low NOx and CO emissions.
The challenge in the implementation of this new gas turbine cycle is the combustor, which must provide a stable combustion process up to ultra-wet conditions. The research activities at the Chair of Fluid Dynamics include both the fundamental combustion physics as well as the development of an initial combustor prototype.

Figure 1: Experiments at ultra-wet conditions on the atmospheric test rig at the Chair of Fluid Dynamics.

First results are presented for a swirl-stabilized combustor, a design which is commonly used in gas turbines. It is shown that the flame significantly changes the combustion process. Depending on the degree of humidity, different flame shapes can occur in the combustor. The steam effectively restrains NOx formation, and single-digit NOx emissions were achieved even at near-stoichiometric conditions and high flame temperatures.
The measured NOx emissions for the natural gas and hydrogen fuels are presented in Figure 2. For both dry and wet conditions, the hydrogen-containing fuels lead to higher NOx emissions due to the higher adiabatic flame temperature. Under wet conditions the NOx emissions of all assessed fuels are significantly reduced. In addition to the reduction in flame temperature, humidity suppresses NOx formation by affecting the reaction kinetics. These effects lead to a significant decrease in overall NOx production. Additionally, the increase in NOx emissions with respect to flame temperature is substantially lower.
Figure 2 also shows emissions predicted with a chemical reactor network, which is used to gain a more detailed understanding of the test results and the underlying reaction kinetics. The reactor network can also be used to predict emissions for new combustion systems. At both dry and wet conditions, the predicted NOx emissions agree very well with the experimental data for the whole range of different fuels.

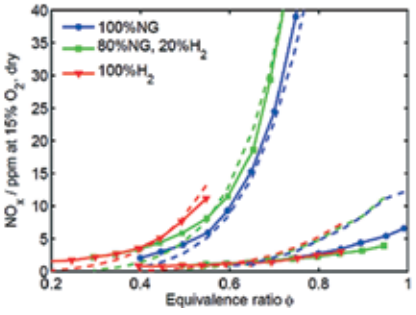

Figure 2: NOx emissions for different fuel mixtures of natural gas (NG) and hydrogen (H2). (Inlet temperature of 370°C. Experiments: lines with markers. Simulation: dashed lines)

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The Emerging Global Gas Market and its Geopolitical Implications for the European Security of the Gas Supply

Traditionally the world gas markets have operated as three largely self-contained regions (Americas; Europe/North Africa and the countries of CIS). Over the last decade, however, the global gas markets and the gas pricing mechanisms have been subject to severe changes: due to a long period of high oil prices and tremendous technological improvements, the production costs for unconventional gas have fallen significantly and the extraction in the US has been extended massively. The US has overtaken Russia as largest gas producer in the world (2009: 593,4 USA vs. 527,5 bn. m^3 Russia). Consequently, large amounts of liquefied natural gas (LNG) scheduled for the American market have been redirected to Europe and Asia.

At the same time, the global LNG trade has grown significantly (from 169 bn. m3 in 2003 to 243 bn. m3 in 2009). European LNG imports have risen and continue to rise rapidly since 2008. These developments coincided with the global economic crisis and led to a remarkable gas surplus on the markets. In consequence, spot market trade has been constantly growing and LNG arbitrage has been observed more often.

Against this background, my dissertation examines how/whether Europe can increase its security of gas supply. It shall be investigated whether certain pipeline projects should be promoted or rather rejected by the EU (South Stream, Nacucco, TAP, ITGI etc.). Finally, the potential role of new interconnector pipelines and LNG for the European security of gas supply will be analyzed in order to derive policy advises regarding the future mix of land-based and LNG-based European gas supply.

From a European perspective, the emerging global gas market raises the following central research question:

Which framework conditions of the natural gas sub-markets have changed, leading to increased LNG arbitrage in the Atlantic Basin and spot market trade in Europe? Which conclusions can be drawn from these developments for the European security of gas supply strategy?

Hypotheses:

1) The increasing production of unconventional gas and LNG were the decisive factors for an intensified competition within the natural gas sector displayed in a significant growth of spot market trade and LNG arbitrage.
2) Currently a persistent deeper convergence of the regional gas markets strengthens gas consumers against gas producers. Due to an increasing divergence of the oil and gas price since April 2009, the existing price setting mechanisms in Continental Europe (Take or Pay, Gas-Oil-Link) are facing a loss of importance. Thus, the dominant position of Russia as the main supplier of the EU weakened.
3) Against the background of an emerging global gas market, the European strategy of expanding the land-based natural gas supply through new pipelines must be questioned or respectively adapted.

As a result of this approach, the dissertation will be divided into five chapters:

1. The Historical Development of the Regional Gas Markets with special focus on Europe
2. The Functionality of Gas Trading (LNG Arbitrage, Spot Markets etc.)
3. Changed Framework Conditions - Heading Towards a Global Gas-Market?
4. Geopolitical and geo-economic implications: European Security of Gas Supply between land-based and maritime imports
5. Conclusion: EU Security of the Gas Supply Given an Emerging Global Gas Market

Supercomputing Technologies for High-Tech Industries

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The paper describes VNIIEF's activities in the area of developing supercomputer technologies and their implementation in high-tech industries.
The key task of supercomputer technologies is simulation modeling on high-performance computer complexes of sophisticated engineering systems. Wide use of simulation modeling is the most effective solution aimed at enhancing performance characteristics of products to be developed, to reduce designing time and cost and, thus, to increase competitiveness of developments.

A special attention is paid to the project "Development of Supercomputers and Grid-Technologies" being implemented in RFNC-VNIIEF since 2010. Under this project, efforts have been taken to implement supercomputer technologies at leading enterprises of Russian atomic power engineering, aircraft construction, automotive, rocket and space industries.
The project's major areas involve:
1. Development of a basic set of super-computers;
2. Domestic software development for 3-D comprehensive simulation modeling on massively-parallel supercomputers;
3. Application of developed domestic program packages at Russian industrial enterprises in order to design and develop novel engineering specimens.

Development of a basic set of supercomputers deal with efforts in two major areas:
- Design and development of unmatched-performance supercomputers. Supercomputers of this level are designed for full-scale simulation modeling of complex technological objects with a high refining degree.
- Development of compact supercomputers, i.e., teraflop-class computer systems, that can be regarded as a routine operating tool for majority of designers and technologists, allowing computations of a great deal of multi-variant models in order both to design and upgrade individual units of equipment.

The key area of the project "Development of Supercomputers and Grid-Technologies" is associated with creation of base domestic software. The subject deals with the development of domestic program packages for 3-D computational simulations of a wide range of problems on supercomputers demanded in high-tech industries.

RFNC-VNIIEF, in conjunction with partners, develops four program packages for computational simulation on supercomputers.
- LOGOS - calculates problems of heat and mass transfer, aero-, hydro- and gas-dynamics. The application area for the LOGOS package lies in atomic power engineering including reactor safety and reliability assessment and selection of optimal operating regimes for reactors.
- DANKO+GEPARD - calculates structural strength under static and dynamic thermal-force loads with due regard to high plastic deformations. The application area for the DANKO package lies in atomic power engineering including numerical studies of NPP building structures, reactor vessels and components of reactor equipment under static and dynamic loads including emergency conditions.
- LEGAK-DK - is for comprehensive simulation of gas dynamics and strength processes.

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Hydrogen Energetics – Lost Alternative

Studies of interaction of aluminum nanopowder (ANP, as = 100 nm) with water are conducted to determine the physicochemical properties of ANPs themselves, prepare ecologically friendly reactive monofuels (whose condensed combustion products are aluminum oxides and hydroxides) and high-porosity oxide hydroxide structures (metalloceramic and filtering materials etc.), and design mobile hydrogen sources on the basis of ANP hydroreaction systems for combustion or catalytic oxidation. Chemical reagents that decompose with the release of hydrogen are of the greatest interest as mobile hydrogen generators. The largest amount of hydrogen is contained in alkali metal hydrides and borohydrides (LiH, NaH, LiBH, and NaBH). Hydrides are, however, hydrophilic, and borohydrides are toxic. Alkali metals are reactive and expensive, and require storage under organic liquids. They vigorously react with water in the combustion mode (with the ignition of hydrogen released). Conversely, group IV–VII metals are unreactive toward water. The Al and Mg metals are of interest for creating mobile "hydrolysis" sources of hydrogen. Their properties are stable, and hydrolysis products are not toxic. The problem with using compact Al and Mg in reactions with water is their low activity (passivation of metal surfaces with insoluble compounds during hydrolysis). It was found in preliminary experiments that the hydrolysis of aluminum plates or magnesium and aluminum–magnesium alloy powders can be performed in solutions in alkalis at pH 11–12. Ideally, a hydrogen-generating system should consist of only two substances, a reducing agent (metal) and oxidizer (water), and hydrogen release should begin at room temperature. The "water–Al" system is capable of producing 1.2 litres of H2 per 1 g of aluminum under normal conditions. Studies directed to the optimization of the characteristics of systems "water–Al" concentrate on the problem of increasing the reactivity of aluminum powder. For instance, coarse-grained aluminum powders (aluminum spherical disperse ASD-1 and ASD-4, aluminum powder, and aluminum pigment powder) passivated with paraffin completely react with 5 % aqueous NaOH during several months and are of no interest for designing mobile hydrogen sources. ANPs passivated, for instance, with Al2O3 are fully hydrolyzed in 5 % aqueous NaOH in 1–2 min. If a solution does not contain alkali, solution temperature increasing from 20 to 80°C results in an explosive reaction between ANP and water. The hydrolysis of ANP yields insoluble aluminum oxides and hydroxides, but their high dispersity does not interfere with the supply of new liquid oxidizer portions to the fresh surface of aluminum. In this work, we studied the influence of heating temperature, medium pH, admixtures of metal cations, and the type of passivating coating on ANP on the kinetics of self-heating in reactions between aluminum nanopowders and water. The objects of study (ANP) were nanopowders prepared by the electrical explosion of wires; these powders are produced on an industrial scale, their properties are stable, and the content of metal in them does not change during 5–6 years.

To summarize, we experimentally found the range H2O: ANP weight ratios (8–25) at which the reaction occurred under optimum conditions with the most complete conversion of ANP in its oxidation with liquid water (the residual content of aluminum in hydrolysis products was 1.4 wt %). We showed experimentally that the oxidation of aluminum nanopowder with liquid water in a suspension preliminarily heated to 64–66°C was characterized by an induction period (0.8–6.0 min) and self-heating to 92°C with heat and molecular hydrogen release.

Environmental Capacity Building as a determinant of the Environmental Kuznets Curve (EKC) hypothesis. Some preliminary results.

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For a long time, industrialized countries are said to have a much lower environmental quality than countries that are going to develop, and it is no wonder that environmental policy making was orientated by an understanding that principally assumes a "Limit of Growth". Considering rebound effects of a worse environment to a country's economic development, policy makers started to highlight the influence environmental degradation has on the development. However, we still do not know enough about the impact economic development probably has on the ecology.

Since the Environmental Kuznets Curve (EKC) hypothesis had been introduced in the early 1990s the model became a prominent feature in the environmental research debate. The EKC's inverted U-shaped pattern suggests a link between per capita income and environmental degradation since environmental impacts initially increases with income up to a certain turning point after which pollution decreases again with rising income.

According to this hypothesis, economic development is not mainly responsible but instead being able to lower the intensity of environmental degradation. In relative terms industrialized countries tend to be more environmental friendly than emerging economies trying to foster economic growth by pre-industrialized and far more environmentally damaging techniques.

Econometrics studies usually tend to leave analytical questions to other research disciplines. Despite the debate of how resilient the empirical evidence of the EKC is or may be, little has been said about why such a curve could exist or why the curve might follow the assumed curve pattern. Some authors speculated that a certain standard of living might change the order of citizen's preferences in a way they pay more attention to non-economic aspects of their life. This demand for environmental quality could then be directed to the political system that should respond with tighter regulations to protect the ecosystem. The plaintive cry for the state presupposes, however, that every state is able to provide such a desired mechanism. Additionally, it should be recognized that the shift of citizen's preferences cannot be a sufficient condition for an increased state environmental expertise. But suddenly the questions occur: a question dealing with environmental competence or at least the question on competitive structural prerequisites which help countries to be environmentally more successful than others.

Although often ignored, the EKC – if perceived as a heuristic model – has a major potential to explain states' ability in a multi-causal framework. If we assume a social and institutional transformation of states immediately before the turning point is generated and if we are able to identify and measure factors directly influencing such a transformation, then the EKC is most likely more than a theoretical model, but a model that implies practical advices to promote a state-run capacity for environmental challenges.

Such an environmental capacity building was already defined by the OECD (1994) as "the ability to identify and solve environmental problems". So the concept could be interpreted in a way that a lack of environmental capacity does not reduce a rising EKC to the wrong choice of policy instruments but to the state-run capacity for solving problems. Up to a certain point of economic development, redistribution in favor of environmental protection takes place. It implies that on high income levels there will be an effective capacity for environmental management provided, which is expressed by a declining degradation-income-curve.

Additionally, capacity buildings mean a development process where the state tries to

improve its capabilities and resources for better structural policy responses to environmental challenges. Such an approach consists of a cognitive-informative, a political-institutional and an economic-technological component. The concept that is used here is limited only to the structural framework. So the study is to analyze only structural preconditions of states that helps to foster specific factors for environmental success and therefore to tunnel through the EKC. States differ less in their patterns to pursue environmental policies rather than in their capacity to implement this policy. Therefore, it seems necessary to make the capacity building measurable for a quite large number of countries and examine its impact empirically on the actual environmental performance. What is done here is to collect data from 30 countries of different income level for a time period ranging from 1990 to 2005 to measure the structural preconditions of states in a self constructed environmental capacity index (eci). This index consists of 38 indicators in 10 indicator clusters.

As a selected result, the time-series regression analysis found that countries with high eci values have tendencially better environmental performances (it is true for the industrialized countries, Costa Rica, Mexico). Countries with low eci values tend to have rapidly growing environmental pressures (like China, India, South Africa). In terms of capacity building, industrialized countries have a lead of about 15 years compared to ten investigated middle-income countries. It is crucial that the political-institutional component influences both the society's cognitive-informative and innovative capacity to implement environmental friendly technologies.

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Energy security in the Arctic as a basis for the sustainable development

The Arctic as a region does not have fixed borders. In my report I will loosely define this region as Alaska, Iceland, Greenland, the Faroe Islands, and the northern areas of Russia, Finland, Sweden, Norway, and Canada.

It is very important to mention that the region is abundant in natural resources. That is why the North is seen as a source of resources for the rest of the world. This is the reason why energy security issues are in the center of economic and political agenda of the region. Many states including non-Arctic (China, Japan, the United Kingdom), want to play an active role in the region, thus getting an opportunity to utilize its energy resources.

The strategic importance of the North is growing due to the increased scarcity of energy resources. Thus, nowadays energy security predetermines development of the region. Sustainable development of the Arctic is closely linked to energy security. Usually the sustainable development means the development that allows people nowadays to use resources in a way to allow future generations to have them as well. Sustainable development includes environmental sustainability, economic and socioeconomic sustainability. Thus, the concept of energy security in the region receives its increasing importance for the region's development. Nowadays we can see transformation of the concept of energy security in the Arctic. It happens due to uniqueness of the region in terms of its geographical location, environment, and climate. The traditional definition of energy security means the security of regular supply and access to oil and gas resources at stable and reasonable prices. The modern definition of energy security in the Arctic includes also security of investment in energy sector of the region, security of the environment, energy efficiency, diversification of energy sources, and energy cooperation between Arctic and non-Arctic states.

Environmental security is in the center of modern energy security issues. Environmental degradation has been affecting the Arctic very strongly. The Arctic region is one of the places in the world which is most sensitive to climate change. One of its most evident impacts is thinning and melting of ice coverage in the Arctic. If this continues, there will be more and more ice-free areas in the Arctic Ocean. On the one hand, it creates new and better possibilities for the use of natural resources. But, for example, an increased traffic, especially

for the transportation of oil and natural gas, in northern sea routes means a growing risk of accidents caused by oil tankers.
It is also very important to mention that, due to the growing demand for energy resources, new sources of renewable energy are becoming more popular. Renewable energy is the energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable.
It is important to redefine energy security in the region and to have a new energy security agenda. This is the main reason for an increased interest in international energy cooperation. International cooperation can be characterized as cooperation between the Arctic states, indigenous people's organizations, and cooperation between the Arctic region and the outside world.
In my report I would like to show the examples of international cooperation in the region. Most significant are the following:
The Arctic Council was established in 1996 as an intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic. The main activities of this organization are associated with discussions on issues dealing with oil and natural gas activities, issues on monitoring, assessment, and action contaminants, protection of the Arctic environment, human and sustainable development, and energy cooperation.
The Barents Euro-Arctic Council (BEAC) was established in 1993 as an international forum for multilateral and bilateral cooperation. Member states are Norway, Island, Denmark, the Russian Federation, Finland, Sweden, and the European Union Commission. It develops a new kind of cooperation in the Barents Euro-Arctic region, and focuses mainly on environmental protection, and economic issues including those on industrial development, regional infrastructure, culture and tourism.
The Northern Research Forum was established in 1991 as a nongovernmental organization. Activities of the Northern Research Forum are linked to certain practical issues rather than to broader political concerns (example: reindeer-herding management, Arctic tourism).
In conclusion it is important to mention that the basis for sustainable development of the Arctic region depends on its energy security. Nowadays definition of the Arctic energy security is transforming into a broader one. International cooperation is becoming increasingly important to foster the energy security.

Equal exchange between countries according to the energy theory of value

The energy theory of value was first developed in the 19th century by Sergey Podolinsky in his paper "Labor Rights and its relation to energy distribution" written in 1880. Later developments in the energy theory of value have appeared periodically. Under this approach, the economy is the energy exchange between people and nature; the economic energy is consumed to ensure the reproduction of life. The surplus product is the result of the excess potential energy contained in the products of extractive industries relative to the amount of kinetic energy expended for its obtaining. Surplus value, or embodied social energy, supplemented by capital could be directed at expanding production, a new organization for scientific research, and etc. It follows that cost can be expressed in units of energy, that is to say that currency can be assigned either a certain amount of energy or a certain number of goods for the production of which the requisite amount of energy was consumed.

Analysis of the main provisions of the energy theory of value has led to the conclusion that an equivalent exchange is an exchange of goods of equal energy capacity. If the energy capacity of goods and its evaluation by actors are the same, there is a true price of the goods, and any discrepancy causes corresponding fluctuations in market

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prices. However, the subject-consumer of value is not able to estimate the amount of energy contained in a given product or service. Consequently, under real market conditions, equal exchange as qualified by the power theory is hardly possible in practice.
With regard to inter-country exchange, the terms of equal exchange according to the power theory can, in my view, be considered as follows: 1) equal pay, 2) energy cost equality of economic systems in the two respective countries and 3) equality of energy technologies in production.
The energy cost of a country's economic system is the energy cost of economic processes within its system. In order to ensure the normal life of people with other things being equal, energy consumption strongly depends on the climate and the geographic territory. Free natural energy helps to save trillions of dollars on infrastructure, fuel, power, building materials, insulation, heating plants, warm clothing, and lower dietary needs, etc. A classic example of a high energy cost country is Russia.

The global market equalizes the cost price of energy. At the same time, the energy cost of a country's economic system varies depending on its landscape-geographical and climatic conditions (that is, temperature and humidity factors). The differences in landscape-geographic and climatic conditions for the business environment, influenced by the balancing price mechanism of the global market, deal with a special type of energy rent. This energy rent is collected by countries with low energy costs and high energy efficiency. Thus, the differences in energy cost among territories lead to a reallocation of resources to those with the greatest energy efficiency. Energy rent provides higher wages and profits which countries with low energy costs can maintain, while remaining competitive in the global market.

Countries with high energy costs cannot be competitive in the products market where there is price competition (standardized low- and medium-price products). Under these circumstances, production of finished goods will be less profitable than selling raw materials and may even generate losses. The absolute and relative effectiveness of Russian exports declines in the area of finished, value-added products. So Russia being a high energy cost country specializes in raw materials exporting.
More opportunities for equal and effective integration into the global economy would lead to the export of more developed products (that is, output from more advanced stages of processing), high-tech products, new technologies, information and knowledge. These products are relatively independent of climatic conditions, transport and geographical factors, and they would permit a reduction in the unequal share of wage costs, fuel, electricity, and depreciation in the price structure.

But there is still a problem: high-tech industries require large capital investment. Countries with higher energy costs yield less surplus product and that's why their investment possibilities in science will be fewer and winning the competition will be quite difficult. For example, in spite of the mining rent, Russia has a gross value added per capita which is much lower than the OECD countries.

The competitiveness of economic systems with higher energy costs under equal conditions of development can be achieved either through lower labor costs or by lowering the price of energy to below the global level, which requires progressive rates of energy output in these countries. The second way is preferred since average monthly wage of 300 to 450 USD begins a process of gradual degeneration of the labor potential.

The country loses, subsidizing exports with depressed prices for energy, but it wins more. The shift away from commodity specialization will allow the country to increase the added value created in its economy. In terms of the consumption of mineral fuels and nonrenewable resources, the global economy is a zero-sum game: raw materials exported to the center cannot be consumed in the periphery. In terms of potential added value, the global economy is also a zero-sum game: exported raw materials cannot be processed inland. Added costs, created on this basis in the importing country, cannot be created in the exporting country.

Recently, the concepts of social and environmental 'dumping' have arisen. Exporters in low-energy-cost countries may engage in a kind of dumping which I will label 'climatic' dumping; climatic dumping is said to occur when a cost advantage exists because fuel and electric power consumption is more cost-efficient in the exporting country than is possible in a high-energy-cost country like Russia. In such a case, the exporters' costs for fuel and electric power are recalculated, on the basis of physical volume, for a concern of like-size in the high-energy-cost country. Of course, one should also make a distinction between excess resource consumption due to the employment of outdated technologies and excess consumption necessitated by natural (climatic) conditions.

Problems of technology and motivation in the use of renewable energy

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Today in the global energy sector the issues of transition to the usage of renewable energy for a new generation of power and heat and its applicability in transportation are being discussed more and more intensely. The fact that the usage of fossil fuels will sooner or later come to its end seems obvious, besides the harm to the nature, which accompanies burning of fossils and this is becoming more and more essential. Such an impact can lead to irreversible consequences of climate change, that's why many countries implement programs of shifting their energy mixes towards technologies of renewable generation.

However, some substantial challenges in adoption of such technologies are present even in the most developed countries. First of all it is their market incompetitiveness, which finds its reflection in vast stimulus programs. Indeed, without such incentives they would not be able to have any market share in current circumstances. The reason for their incompetitiveness is low efficiency, low capacity (which considerably restricts the potential economy of scale) and their expensiveness. For their adoption governments intentionally distort market conditions which leads to extra loads on the taxpayers and quite questionable results in the development of those technologies. We are persuaded that this is the case due to impossibility of usage of market mechanism in implementation of such large-scale energy programs: companies develop technologies (exercise investment in R&D) only to that extent, which is reasonable in current economic situation, this conjuncture itself implies state subsidies. That's why given the investment cycle of 20 years (which is the case in solar generation) and the existence of state pay-off guaranties companies lack further impetus for more efficient technology use. The slow-down and stagnation in efficiency increase leads in turn to increased loads on taxpayers, on the one hand, and to a decrease of competitiveness of country's goods on the global market on the other hand. This concerns especially energy intensive industries.

To our point of view this divergence in growth rates of efficiency and demand for usage of renewable cannot be eliminated by companies themselves in course of regular market process. Companies are in need of state support and of scientific research sphere, as well as of financing these arrangements.

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Block copolymer thin films as templates for nanostructured hybrid solar cells

One of the key issues of the development of efficient hybrid solar cells is the control of the morphology of the photoactive layer. By microphase separation thin films of block copolymers can self-assemble into various highly ordered nanostructures providing domain sizes down to the 10 nm scale. The selective degradation of one of the two blocks of the block copolymer leads to a nanoporous template that can be filled with a semiconducting material. After subsequent removal of the remaining template a freestanding semiconducting nanostructure is achieved.
A great number of materials that are of interest for the application in hybrid solar cells are accessible by electrochemical deposition. Thus conductive polymers, e.g. polythiophenes, as well as inorganic compound semiconductors, e.g. zinc oxide, titanium dioxide and copper(I) oxide, can be deposited even into most complex nanostructures that are hardly accessible by any other methods. Besides of being a cheap, straightforward one-step method, electrodeposition may ensure exact control over thickness, location and even the opto-electronic properties of the deposited materials. Owing to our expertise in the investigation and manipulation of morphologies formed by the self assembly of block copolymers in thin films, we have investigated the phase behavior of several poly(styrene) based block copolymers. The application of strong electrical fields on the block copolymer films by means of a capacitor-like device provides the alignment of the self-assembled nanostructures and can induce phase-transitions to form highly oriented phases.

Controlled electrochemical filling of the nanostructured templates with a donor or acceptor component and subsequent infiltration of the resulting semiconducting nanostructure by the corresponding component using a second electrodeposition step is a straightforward route towards the fabrication of highly ordered photoactive layers featuring bulk heterojunction structures in the 10 nm range.

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The problems of selling of the engineering services in the market of cable products in Russia

Using any kind of energy for electric power, there will be energetic companies that will transmit this energy to consumer. And these energetic companies will need for this power transmition correctly installed cable lines, installed by an engineering company.
The main reasons of development of the market of cable lines in Russia are:
Construction of new cable lines. (Increase in demand for electrical power, construction of new infrastructure objects needs the construction of new high voltage cable lines).
Replacement of oil-filled cable for cable lines with XLPE insulation. (The oil cables need to be changed to XLPE – cables, as these cable lines are more reliable. And XLPE-cables have a longer life).
Construction of cable lines instead of electric transmission line. (The construction of air lines is cheaper, than construction of XLPE-cable, but more expensive in its service, and it needs quite a wide territory that can't be used for anything else).
Realizing projects in high voltage energy sector,

we can't separate the sale of cable products (from one side), and engineering services (on the other) and technological works. This is a complex (mix), which includes all these elements.
If we consider the market of cable products for high voltage (110 Kv and above), you can't just sell the length of cable. Because ultimately, the customer doesn't buy length, thickness and quality of the cable, but a certain amount of electricity, which he will be able to transfer from point A to point B. So there are a lot of questions, which are necessary to ensure that the customer would be able to transmit electrical energy.
A tender is the starting point of distribution of these engineering projects, the main purpose of tender is making a choice by a customer about a company that has offered the best conditions on time, financial, technical and other criteria. So identification of the main barriers the author would like to show from the position of such a company.
There is the task before the representatives of the engineering company to find firms for subcontract works which have experience and necessary licenses and certificates to perform the task. Important: EXPERIENCE, LICENSES, CERTIFICATES so the customer would be able to get a correctly installed cable line, which will operate more than 30-40 years. (Experience)

If an electrician constructs cable in a flat incorrectly, trouble, fire may occur. Accordingly, in high-voltage projects errors grow up in a progression. Competent, qualified engineering services and specialists help to prevent these errors.
If you look at the list of companies who make design engineering there will be more than 100 companies in the electric power industry. Almost all will design the cable line and that they have a license for designing of HV lines and equipment, but in these licenses there is no point about designing of cable lines. (Design process)
As a result, errors in the design occur during construction and electric installation work.
Another very important aspect is that the engineering company needs to make choice between the technical and economic solutions. Ideally, find some optimum. (Extremely low price)
Another problem in distribution is the climate. Russia is located in the climatic zone, where there's winter during a half a year.

As a rule, all of the funding for the project begins with the new financial year (in January). Funding for the project is released in March at the best; the equipment in the best case can be ordered and purchased in June. Supply of high-voltage equipment is from 3 to 6 months. Production of cable, as a rule, goes during summer period. Installation of cabling at the best could begin in autumn. In the good tradition the work should be completed by end of October. But 99 % of the projects by end of October are not finished, but only start and continue in winter. At the best they end by 22 of December - the day of power in Russia. At worst they end for the New Year or spread over the entire winter period (Seasonality).
Working during cold period immediately causes a rise in the cost of project - doubling-tripling of the funds for engineering works for unforeseen winter expenditure about which it was not even supposed to think in summer.
Also there's one tacit problem the problem of financial ambitions of the customer, the expectation of the so-called compensation for the adoption of the engineering company to the project. And engineering companies have to satisfy these financial ambitions to win the tender.

The next problem is connected with After-sales service. It should be provided within from 2 to 5 years. But neither of the parties wants to spend money on after-sales service. In Russian conditions quite often we have company like "Pupkin and sons" that could not be found in a year after finishing a project. Therefore, the customer wants to receive a guarantee usually of the manufacturer of equipment in a project. As a result such companies are "backed into a corner". As they have to correct errors of subcontract companies that can't be found sometimes after finishing a project.

The last problem is the problem of dividing risks. If the project is executed with the participation of a Western company the latter is ready to work only on the supply of equipment. All risks have to take national companies.

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GTL products as a mean of increase in global energy security

Gas to Liquids (GTL) technology has been around for decades; however, only with advances in catalyst research has it become economically attractive. Economy of scale and technological innovation reduced capital expenditure requirements. Nowadays increasing oil prices make GTL products even more competitive. However, the final cost however is site-specific, depending on available infrastructure, local manufacturing industry and construction costs.

GTL products have some great advantages. They are cleaner than conventional refinery products, very low in sulphur and are biodegradable. GTL fuel products are burnt with significantly lower smoking and lower emissions of dangerous substances. The existing diesel infrastructure can be used unchanged for the GTL diesel so this type of fuel has huge potential to comply with future more strict emission regulations in a cost-effective manner. GTL products reflect the idea of "3 E's": energy security, economic efficiency, and environmental protection.

Worldwide interest in GTL production technologies and products has recently increased dramatically. The reasons are that GTL is viewed as a possible pathway to strategic diversification of energy supply sources to lower oil dependence and diversification of market risks for both producers and consumers.

60% of gas reserves are considered stranded because they are too far from the consumers and difficult to transport. A large part of the reserves are located more than 5,000 km from the great centers of consumption. GTL has the potential to convert a significant percentage of this gas into several hundred billion barrels of liquid petroleum. Transport cost of GTL products is much less than the transport cost of natural gas, as GTL products do not require specific assets (gas pipelines or methane ships). In accordance with global market tendencies such as liberalization of gas markets, long term contracts become difficult to achieve and execute. Price volatility has increased the risks to buy or sell gas at pre-set prices. GTL products can be sold by short-term contracts with a reduced interdependence between buyers and sellers. Using GTL technology represents an appropriate response to the new context of the international market of natural gas, which demands greater flexibility in contracts and less interdependence between buyers and sellers.

Aside from above, using GTL fuel gives significant reduction in emissions, which bears high importance for big cities such as New York, Mexico, London, Moscow, etc. Another benefit is less gas flaring (most done in Russia, Caspian region, Middle East and North Africa), which has serious environmental consequences: release of different pollutants into the atmosphere, acid rain, greenhouse effect and global warming.

Political tension and fear of possible OPEC actions could be decreased with wider implementation of GTL technologies. Unequal geographical distribution of oil has influenced political and military actions. With GTL technology countries could diversify their import of energy resources. Decreasing oil import will lead to reduction oil dependence on a worldwide scale. The existence of a good quality substitute for petroleum can change the OPEC strategy and market competition:

First, the cartel's pricing problem will include joint maximization of profits over two feed stocks instead of just one.

Second, creation of a new substitute increases world price elasticity of demand for crude oil.

Third, since the distribution of gas reserves among cartel members is substantially different from those of oil, a change in the balance of power within the cartel is likely, this affects internal decision making.

In principle, the possible long-term potential of GTL is huge, as synthetic fuels may in theory substitute conventional transport fuels and chemical products. GTL products are likely to gain significant market share as many new resource discoveries are at remote locations where neither local use is possible nor infrastructure for transportation over long distance are available or are economically affordable to build.

Energy efficient control of street and building illumination

JUNIOR SCIENTISTS

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Streetlights are among the most important city's assets, providing safety of road traffic, public places, private homes, businesses, and city centers. However, they're usually expensive as they consume a lot of energy. For example the annual electricity cost to illuminate a city of 100,000 people is more than $900,000 in most European countries. In Russia it takes about $300,000. The number of streetlights along with the wattage of installed lamps and ballasts multiplied by the typical yearly usage (approximately 4,000 hours per year per lamp) are the main components contributing to the total cost. Besides being costly, streetlights contribute to air pollution. The production of electricity needed for power street lighting systems adds to carbon dioxide emissions and nuclear dust.

The challenges of illumination systems and solutions

The first step to increase streetlight efficiency, while reducing maintenance and electricity costs, is to take inventory of all luminaries and lamps. In turn, one could identify streetlights which can be equipped with lower wattage lamps while delivering at least the same amount of light on the ground. For example, in Chelyabinsk (Russia) more than 25 percent of supply cabinets were retrofitted over the last 2 years. Such projects appear to be ideal opportunities for deploying energy efficient solutions in street lightening, based on automatic control and monitoring systems. Addressing the above issues, the energy saving research program was established in South Ural State University. In the scope of such a program automatic control systems with light-emitting diode (LED) light sources and electronic ballasts for high-pressure sodium (HPS) lamps were developed.

The general structure of the presented control system includes the following levels:

1. The top level of the automated dispatching management includes a database server and PC-based workstations.
2. The middle level is presented by automated supply cabinets with smart controllers, connected to the top level server by means of wired or wireless communication lines.
3. The bottom (field) level is presented by the controlled streetlights connected to automated cabinets.

Technologies of data transmission between smart controllers and street lights

One of the biggest challenges is the technology of data transmission between smart controllers and street lights. At the best of our knowledge the most perspective technologies of data transmission are:

- application for data transmission of a low-power radio network of ZigBee or WirelessHART standards;
- using power feeding lines by means of PLC-modems.

A case study of the energy efficient automatic control system of the South Ural State University buildings illumination

A pilot project of illumination control system of the SUSU dormitory building was compiled in 2010. Power feeding lines are used in this project to deliver control signals to LED-lamps. The control system is designed for lamps brightness regulation during the night time. The efficiency control allows saving up to 35% of energy consumption.
At the present time, the specialists of South Ural State University Dispatching laboratory are working on designing of new lamp control modules for LED and HPS lamps, based on new IT700 PLC-microcontrollers from Israel's Yitran company. IT700 is a fully integrated Powerline Communication (PLC) modem and application solution on a single chip. At this time, the project is at its final stage, and in 2012 the pilot implementation is planned.
Another interesting and progressive technology is WirelessHART standard – a notable solution for higher reliability and longer data transfer distances. WirelessHART is a wireless sensor networking protocol stack that utilizes a time synchronized, self-organizing and self-healing mesh architecture. It was originally created as an industrial-oriented protocol and

in comparison with ZigBee it has a number of essential positive distinctions.
All WirelessHART devices operate in extended temperature and humidity ranges that facilitate their outdoor use. High output power mode together with extra receiving sensitivity provide reliable communication for up to 300 m outdoors and 40 m indoors. An ability to provide ultra reliable data delivery outnumbers any other mesh network technology. Finally, WirelessHART provides high strength of data encryption using modern algorithms. Some of the SUSU campus buildings are planned to be equipped by the illumination control system based on developing WirelessHART devices in 2012.

Conclusions

The technology of managed networks and more efficient lamps can save electricity in outdoor and indoor lighting in the public and private sectors including major complexes such as colleges and universities, hospitals, shopping centers, apartment complexes and other major users of outdoor lighting.
The South Ural State University development program is a high visibility effort to make street and building illumination systems of cities more energy efficient and ecological. Applying lighting efficiencies to our nation's major universities have an important impact on energy saving and would set an example for students and the broader community.

JUNIOR SCIENTISTS

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Preparation of core-shell structures loaded with photodynamic dyes by Layer by Layer assembly method

Photodynamic therapy is rather new and promising method for cancer treatment . It is based on the usage of light-sensitive substances, namely photosensitizers (photodynamic dyes), and irradiation with determined wavelength. Photosensitizes are accumulated mostly within tumor tissue which allows to destroy them by irradiation using wavelength corresponding to the absorption maximum of these photodynamic substances. Irradiation induces a photochemical reaction leading to the death of cancer cells. Although photodynamic dyes have selective accumulation, there are some cytotoxicity effects because of the interaction of phodynamic dyes with blood proteins. To minimize these effects, we proposed phodynamic dye encapsulation using calcium carbonate cores and layer-by-layer electrostatic adsorption technique. We suggested that usage of calcium carbonate core and layer-by-layer electrostatic adsorption method for phodynamic dye encapsulation could be employed for targeted drug delivery to decrease toxicity of phodynamic dyes. We encapsulated photosensitizers within core-shell structures. "Dye-in-core" and "dye-in-shell" structures were prepared.

As a photodynamic dye Photosense was used. As templates for fabrication of core-shell structures calcium carbonate microparticles were used. Previously described technique for core fabrication was applied. However, we proposed some modifications of this method, namely co-precipitation of anionic polyelectrolyte at synthesis and ultrasound treatment.
An average size of the prepared microparticles was 1 μm. Polyelectrolyte shells were prepared by self-assembly method using biocompatible polymers (chitosan and dextran sulfate sodium salt) adsorbed layer-by-layer on the calcium carbonate microparticles. The photodynamic dye was embedded either into calcium carbonate cores by direct precipitation at synthesis ("dye-in-core" structures) or within the polyelectrolyte shells ("dye-in-shell" structures). Dye presence in core-shell structures was confirmed by confocal Raman microscopy. The photodynamic dye was localized into core-shell structures.
To estimate phothodynamic dye concentration in structures, optical density spectra were measured. It was established that for "dye-in-core" structures more photosensitizer has been encapsulated.

As a result, biocompatible dye-filled structures of two types ("dye-in-core" and "dye-in-shell") were prepared and optimized. Possibility of shell structure modification and simplicity of the preparation technique are significant advantages of LbL assembly method. Usage of biocompatible polymers allows appling the obtained core-shell structures for biomedicine. These structures could be employed for targeted drug delivery systems.

Peat: raw material reserves, fuel types and application potential

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JUNIOR SCIENTISTS

Peat is an organic material; it forms in the process of decaying and incomplete decomposition of bog plants in conditions of overwetting and inhabited access of oxygen.

Peat is classified as caustobioliths that is organically formed fuels, and is specified by the initial grade of biomass metamorphism. Peat is referred to as slowly renewable resource because biomass of bog plants is involved in formation of peat deposits. According to our estimates the speed of peat formation is 1 mm per year, which amounts up to 250 mln tons on a scale of peat bogs in Russia (in terms of 40% humidity).

About 37% of world resources are concentrated in Russia, calculated in terms of fuel equivalent it will compose more than oil and gas together, that's why there are huge possibilities of peat fuel usage in the Russian Federation.

World peat reserves amount are about 500 billion tons, and the most part them is concentrated in Russia, Europe and North America. At the present time proven experience of large-scale peat mining is being realized in several countries such as Finland, Ireland, Belorussia, Canada, so on. The Germany was peat mining country too and played a big role in the formation of science and technologies of peat processing and usage. In a number of countries mining is realized in a less degree, in spite of availability of reserves sufficient for commercial exploitation. As a rule the reason of peat deposit development is determined by the lack of own energy resources and high cost of the imported ones.

Peat usage is well known to humanity since ancient times. Its usage has been developing from home-produced method for household use to foundation of large industrial centers. For example peat usage played significant role in realization of GOELRO plan (electrification of the country).

According to combustion heat value peat is positioned between firewood and coal, besides characteristics of the peat products approach to the figures of brown coal.

Peat fuel has environmental advantage in comparison with coal and oil fuel, which conforms to the requirements of Kyoto protocol on emission reduction. Emission of peat fuel combustion contains much less sulphur dioxide (up to 10 times) which is the main reason of acid rain.

Peat fuel products are manufactured as follows:

- milled peat;
- sod peat;
- briquettes (different options);
- pellets.

If peat can be used near the mine site or can be delivered using relatively cheap mode of transportation, it's reasonable to mine milled peat because its net cost is lower compared with other types of peat product. In case there's necessity to perform long-distance transportation of peat fuel, and also in case peat is going to be used for household firing, optimal way is to mine sod peat. Briquetted production have better qualitative characteristics (such as combustion heat, density, and so on), that is why it's reasonable to use this type of product for long-distance transportation and to employ it as a fuel of higher grade.

One of the world marked trends of biofuel usage is adoption of pellet firing. In the process of peat pelletizing several problems arise: high initial wet content of the raw material which increases net cost; ash content of peat which results in damage of equipment.

Instorf is developing a project on manufacture of innovative pellets. Production of these pellets is based on formation of peat grain structure while graining in wet condition and drying. This allows excluding high pressure and temperature from graining process. Proposed process solutions give opportunity to use raw material with relatively high ash content without damage to equipment and to regulate final wet content of the fuel, which allows reducing costs for drying significantly. Elaborated method of physic-chemical strengthening of the structure allows getting grained fuel with density 1100…1200 kg/m3, which quality level corresponds to the quality of briquettes and pellets. Industrial tests on this project are being carried out now.
Combination of the present technology with the field manufacturing process of sod peat make it possible to create effective industrial complex: the stage of field manufacture reduces net cost of fuel, and the stage of plant production decreases risks connected with bad weather.
There is also one more promising direction of peat materials application in energy sector that is pyrolysis with catalyst. Experiments showed that by addition of natural mineral components calorific value of the received gas mixture can be increased up to 100%, temperature of pyrolysis can be decreased up to 460 °C.
The detailed information regarding these and other projects is posted on the web-site of East European Institute of Peat www.instorf.ru
We're constantly developing various projects and practicing technologies at production plants increasing peat utilization effectiveness. According to our estimates at a time when world market price for energy resources is increasing, peat may become competitive alternative, which has acceptable price and damages the environment less than other fuel types.

JUNIOR SCIENTISTS

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Analyses of the Alternative Energy Sources Development

1. Introduction.

Protection of the Environment and Climate and their preservation for the generations to come is a demanding social, scientific and economical task. Utilization of renewable energy, efficient conversions of fossil fuel are not only environmentally and climatically beneficial, they also preserve the finite energy sources.
The price jumps in the oil scenario, has surely made the scientific community know the importance of safe and secured energy supplies for the highly industrialized nations.
In the INTERNATIONAL ENERGY OUTLOOK 2011 Reference case, which does not incorporate prospective legislation or policies that might affect energy markets, world marketed energy consumption grows by 53 percent from 2008 to 2035. Total world energy use rises from 505 quadrillion British thermal units (Btu) in 2008 to 619 quadrillion Btu in 2020 and 770 quadrillion Btu in 2035 (Figure 1). Much of the growth in energy consumption occurs in countries outside the Organization for Economic Cooperation and Development (non-OECD nations), where demand is driven by strong long-term economic growth. Energy use in non-OECD nations increases by 85 percent in the Reference case, as compared with an increase of 18 percent for the OECD economies.

2. Situation in the world.

Leading the race for power production from renewable sources in 2010 was Iceland (with around 25 % of total energy derived from alternative energy sources, mainly, geothermal energy).
By 2020, the European Union's 27 member states are mandated to use 10% biofuels in their overall transport fuel use under the Renewable Energy Directive (RED). It is an ambitious goal but one that many are determined to reach.
Germany. The share of electricity produced from renewable energy in Germany has

increased from 6.3 % of the national total in 2000 to about 17 % in 2010 (mainly, wind and biomass).

The USA. Renewable energy accounted for 11.14% of the domestically produced electricity in the US only in the first six months of 2010. Hydroelectric power is currently the largest producer of renewable power in the U.S. It produced around 6.0% of the nation's total electricity in 2010 which was about 70% of the total renewable power in the U.S. The US has tremendous wind resources both offshore and on land. At the close of 2010, the nation had more than 40,000 megawatts of land-based installed wind power capacity.
China. About 17 % of China's electricity came from renewable sources in 2010. In 2009, three Chinese Ministries jointly announced the Golden Sun Demonstration Program, which will provide investment subsidies equal to 50 percent of the investment cost for grid-connected solar power systems. Although it is too soon to assess the impact of this measure, the subsidy is so large that it is virtually certain to increase the demand for solar power generating equipment.
India. India has one of the world's fastest growing energy markets and is expected to be the second-largest contributor to the increase in global energy demand by 2035, accounting for 18% of the rise in global energy consumption. In July 2009, India unveiled a US$ 19 billion plan to produce 20 GW of solar power by 2020. Plan 2007–2012: Establishes a target that 10% of power generating capacity shall be from renewable sources by 2012 (a goal that has already been reached).
Russia. Renewable energy in Russia mainly consists of hydroelectric energy. The country is the fifth largest producer of renewable energy in the world… although it is 56th when hydroelectric energy is not taken into account. In Russia:

1. Geothermal energy, which is used for heating and electricity production in some regions of the Northern Caucasus and the Far East, is the most developed renewable energy source in Russia.
2. Roughly 68% of Russia's electricity is generated from thermal power and 16% from nuclear power.
3. Solar energy is virtually nonexistent in Russia, despite its large potential in the country. The first Russian solar plant was opened in Belgorod Oblast in November 2010.
4. We plan for the construction of a wind power plant in Yeisk, on the Sea of Azov.

2. Conclusions.

If they can be used effectively, many of these renewable alternative energy sources have the potential to provide enough power to fully replace current energy sources. An energy storage facility that utilizes a combination of hydrogen, wind energy and solar power will be able to create more energy, in fact, than the entire of the population of the planet will ever be able to use. Our future most definitely lies in our ability to effectively develop renewable energy sources, our only challenge will be to ensure that we are applying these technologies to regions that will yield the best results to the people of that area.

The challenge of conversion to alternative energy sources with the concurrent problems of population size and stabilization, and adjustment of economies and lifestyles is clearly at hand. A realistic appraisal of the future encourages people to properly prepare for the coming events. Delay in dealing with the issues will surely result in unpleasant surprises. Let us get on with the task of moving orderly into the post-petroleum paradigm.

JUNIOR SCIENTISTS

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Effectiveness of UV-LEDs for water treatment

As we know effective water treatment and specifically disinfection is extremely important. UV disinfection is a well-established disinfection technology that has been used in centralized water and wastewater facilities in developed countries for decades. UV radiation inactivates bacteria, viruses, and protozoa, with the benefits of no taste and odor issues, no disinfection by-products, no danger of overdosing and low-maintenance. The effectiveness of this process is related to exposure time and intensity as well as general water quality parameters.

UV purification systems need to produce photons with wavelengths shorter than 265 nm, giving them the energy needed to break chemical bonds between corresponding base pairs within DNA and RNA polymers of microorganisms. Rather than forming the usual hydrogen-bonded thymine-adenine (T-A) base pairs in the DNA double-helix, neighboring thymine pairs on a single chain form covalent bonds, disrupting the genetic code.

Usually, a low-pressure mercury lamp emitting an effective germicidal UVC is used as a light source in UV water purification systems. Conventional UV lamps consume much energy and are considered to be problem waste after use.
A relatively new method to generate UV light is the use of UV-LEDs. Particular attractions of UV-LEDs are their free of toxicants and less energy consumption than traditional lamps. Also, LEDs transmits greater amount of energy into light and wastes little energy as heat. Moreover, UV-LEDs are hard to break and emit only desirable wavelengths. Thus, high efficiency solid-state ultraviolet light sources with emissions in the UVC range are expected to be used for water, air purification and food sterilization. Most UV diodes are based on aluminum gallium nitride alloys in p-n format. Although the efficiencies of near UV emitters (400 – 365 nm) are excellent, the picture is very different for UV emitters based on AlGaN alloys.
We have analyzed recent patents and found some devices which had already been developed by the year of 2011.

In Japan Prof. Dr. A. Hamomoto and over researchers were developed water disinfection device and evaluated the ability of high-energy UVA-LED irradiation to inactivate bacteria in water, they also were founded that mutagencity of UVA irradiation is comparable with UVC irradiation at the same inactivation level. In USA scientists of Sensor Electronic Technology were developed UV-LED disinfection unit in which sterilization effect in the chamber is achieved with one LED plate.

Prof. Dr. Kneissl of Berlin University of Technology and other research workers such as Tim Kolbe, Marlene Wurtele and Eric Hoa were developed two modules for biodosimetry trials. They were also conducted some UV-LED disinfection performance tests.
Most of the devices to improve the quality of potable water do separate tasks. Traditionally, filters have been employed to filter suspended particles or dissolved ions out of water while ultraviolet light have been used to sterilize water. This leads to raise in price of water purification processes. Moreover, the cost of UV disinfection device equipped with a low-pressure mercury lamp is comparatively high because the life of the lamp is rather short and its energy consumption is high. According to recent research, if deep UV-LED could be used instead of conventional ultraviolet light sources, miniaturization of the device might be recognized. All of this inspired us to create LEDPure.
LEDPure is water purification device wherein one element enhances the function of the other while each element performs its own function. LEDPure is directed at being installed in existing water plumbing in houses. It also can be use for aquariums and ponds, to maintain a safe environment for fish and other marine life.

Development of the device began with searching for optimal constructive characteristics that ensure high quality of treated water. Purification process takes place in two steps: during the passage of water through flow energizer, when water passes through the filter medium.

The filter casing is removable allowing use of different filter medium. The presence of flow energizer with many nozzles allows water distributed as a thin layer on the inner surface of the body. Thin layer of water is disinfected by ultraviolet rays emitted by the deep UV-LEDs. Deep UV-LEDs in LEDPure are connected in series to a single power source. By combining two-stage removal of impurities with the ultraviolet light disinfection LEDPure allows to guarantee high quality of drinking water. From sketching the development was continued in 3D using CATIA. For modeling of water purification in LEDPure we used Autodesk 3ds Max.

More research is needed to develop a practical, implementation-ready, water disinfection unit. This includes disinfection unit geometry and testing disinfection effectiveness for different pathogen types is also necessary before UV-LED technology can be utilized for reliable treatment.

Photo: TY 214, wikipedia


Photo: TY 214, wikipedia

SUMMARY

Tobias Stüdemann

Head of Liaison Office of Freie Universität Berlin in Moscow

The closing Plenary Discussion was moderated by T. Stüdemann

Prospects for Young Researchers: What can be expected from Research Organizations?

Not by accident was the Week of the Young Researcher's closing panel discussion devoted to the topic 'Prospects for Young Researchers'. After having heard quite a lot about the funding opportunities offered by German organizations, the participants were prepared to compare them with their situation and future possibilities. The situation of young researchers all over the world is difficult – most countries cut costs and spend less money on higher education and research. Russia is no exception to this rule. Nevertheless, the closing panel discussion, led by Dr. Liliya Bondareva, Deputy Chairman of the Council of the Russian Union of Young Scientists and Tobias Stüdemann, Head of Liaison Office of Freie Universität Berlin in Moscow, showed, that there is big interest in science. Both the panelists, Dr. Jörn Achterberg, DFG and Dr. Gregor Berghorn, DAAD, representing German intermediary organizations, but also PhD students Paul Kowitz from Freie Universität Berlin and Konstantin Leshchenko from St. Petersburg State University as young researchers, shared their opinion on the topic and there was a very active involvement in the discussion by the public as well.

Despite the fact that the motivation to dedicate oneself to science may be different for every individual, young researchers are highly interested in doing research. Often a deeper interest arises during university studies and is supported by professors in both countries. The questions concerning the realization of a PhD-study in Russia or Germany can be differently answered. It became clear that getting a scholarship in Germany may not be as easy as it used to be some years ago, but from a monetary point of view, it is enough, to enable the grantee to live and carry out research sufficiently. Yet it is almost impossible to do so in Russia, because scholarships and support from the university's side are very low. Almost all young Russian scientists work part time or have a partner, who financially supports their studies. Therefore studies in Russia take much longer than expected, due to financial pressures and time constraints. This situation changes to some extent due to the support, provided by German research organizations. Although DAAD and DFG spend a huge amount of money in Russia, compared to other countries, young researchers cannot make use of all the programs offered without causing problems at their home institutes. Even in Germany problems exist, too. To find a position as a researcher either at a university or at one of the very many research institutions right after the PhD-thesis has been finished, is quite difficult and requires quite a long preparation time.

In order to change this situation, not only individuals, but interested groups might be useful. Similar interests, but to some extent different problems – this is how one could summon up the outcome of the discussion. But in any case and to conclude with citing the final words of Dr. Achterberg we could say: "First finish your thesis and afterwards do politics."

List of participants of the International Conference

The week of the young Researcher: Man and Energy

Kazan Federal University

September 19 – 24, 2011

GERMAN DELEGATION

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Dr.	BERGHORN	Gregor	German Academic Exchange Service Head of DAAD Office Moscow Managing Director of DWIH Moscow
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Mr.	BRANDENBURG	Ulrich	Ambassador of the Federal Republic of Germany to Russia
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Mrs.	OKHATRINA	Veronika	PhD student, Economics St. Petersburg State University
Dr.	PODVOYSKAYA	Nataliya	Project Coordinator, Social Science National University of Science and Technology "MISIS"
Prof. Dr.	SAKHIBULLIN	Nail	Head of Astronomical Department, Federal University of Kazan; Academician of Academy of Sciences of Republic of Tatarstan
Prof. Dr.	SALIKHOV	Kev	Director of Zavoisky Physical-Technical Institute, Kazan Scientific Center of Russian Academy of Sciences
Dr.	SHCHEGLOV	Aleksandr	Chairman of the Council of the Russian Union of Young Scientists
Dr.	SHNAIDER	Dmitriy	Associate Professor, Automation South-Ural State University
Prof. Dr.	SINYASHIN	Oleg	Chairman of Kazan Scientific Center of Russian Academy of Sciences
Dr.	SOROKIN	Sergei	Associate Professor, Political Science Northern (Arctic) Federal University Archangelsk
Mrs.	SVENSKAYA	Yuliya	PhD student, Solid-State Physics Saratov State University
Dr.	TIMOFEEV	Aleksandr	Associate Professor, Earth Sciences Tver State Technical University
Mr.	TONKOSHKUROV	Igor	PhD student, Economics Khakass State University
Mr.	TVERDUNOV	Pavel	PhD student, Engineering Ulianovsk State Agrarian Academy

TITLE	LAST NAME	FIRST NAME	STATUS / INSTITUTION
Mrs.	USOVA	Galina	PhD student, Electrotechnology Ural Federal University
Mr.	YANCHENKO	Sergei	PhD student, Electrotechnology Moscow Power Engineering Institute
Dr.	YANCHUSHKA	Zlatitsa	Associate Professor, Economics and Mathematics Ufa State Petroleum Technological University
Mrs.	YEPIKHINA	Raisa	PhD student, Economics Moscow State University
Mr.	YEROSHENKO	Stanislav	PhD student, Electrotechnology Ural Federal University

Programme

September 19, Monday

till 18:00 **Arrival of Participants**
Hotel Marriott

19:00 **Words of Welcome to the Participants of the Conference by**
- Dr. Gregor Berghorn, DAAD Moscow
- Dr. Jörn Achterberg, DFG Moscow
- Dr. Aleksandr Shcheglov, Chairman of the Council of the Russian Union of Young Scientists (ROSMU)

Hotel Marriott

September 20, Tuesday

09.00 – 11:00 **Excursion through Kazan-City**
Hotel Marriott

11:00 **Registration of Participants**
KFU "Aktovyj Zal"

12:00 **Official Opening of the Week with welcome addresses by**
- Prof. Dr. Ilshat Gafurov, Rector of Kazan Federal University
- Prof. Dr. Albert Gilmutdinov, Minister of Education and Science of the Republic of Tatarstan
- Mr. Ulrich Brandenburg, Ambassador of the Federal Republic of Germany to Russia
- Prof. Dr. Peter Funke, Vice-President of the DFG
- Prof. Dr. Max Huber, Vice-President of the DAAD
- Dr. Aleksandr Shcheglov, Chairman of the Council of the Russian Union of Young Scientists (ROSMU)

(afterwards: move to KFU Conference Hall)
KFU "Aktovyj Zal"

13:00 **Opening Lecture "Education and Research in Tatarstan: Facts and Prospects"**
Prof. Dr. Albert Gilmutdinov, Minister of Education and Science of the Republic of Tatarstan
- Discussion -
KFU Conference Hall

14:00 **Lunch**

14:30 **Introductory remarks to The 1st German-Russian "Week of the Young Researcher"**
- Prof. Dr. Peter Funke, Vice-President of the DFG
- Prof. Dr. Max Huber, Vice-President of the DAAD

15:00 **1st Plenary Lecture**
"Green Energy?"
Prof. Dr. Oliver Paschereit, Technische Universität Berlin
- Discussion -

16:00 **Coffee Break**

16:30 **Short Lectures of Young Researchers**
- Chairman: Prof. Dr. Oliver Paschereit
- Ms. AKCHURINA, Svetlana: "Analysis of optimal location of deep lead-in substation for peripheral districts of big cities"
- Mr. BEGLJAROV, Andrey: "The new wall blocks of volumetric pressing and effective technology of its production"
- Mr. BOBUSCH, Bernhard: "Analysis and Modeling of Combustion Instabilities"
- Mr. GRASMIK, Konstantin: "Features of the development and commercialization of innovation in the energy sector"
- Mr. •OSI•, Bernhard: "Control and Suppression of Combustion Instabilities"
- Ms. OKHATRINA, Veronika: "GTL products as a mean of increasing global energy security"
- Ms. BONDAREVA, Liliya: "EU-Russia energy diplomacy: two-way street?"

18:15 **Panel Discussion: "Traditional vs. New Energy: A serious challenge for Research"**
Invited panelists:
- Prof. Dr. Peter Funke, Vice-President of the DFG
- Prof. Dr. Max Huber, Vice-President of DAAD
- Prof. Dr. Ilshat Gafurov, Rector of Kazan Federal University

- Prof. Dr. Albert Gilmutdinov, Minister of Education and Science of the Republic of Tatarstan
- Prof. Dr. Akhmet Mazgarov, President of the Academy of Sciences Tatarstan (ANTAT)
- Prof. Dr. Oleg Sinyashin, Chairman of Kazan Scientific Center of the Russian Academy of Sciences (RAS)

Chairman: Dr. Aleksandr Shcheglov, Chairman of the Council of the Russian Union of Young Scientists

19:15 **Evening Reception by the Minister of Education and Science of the Republic of Tatarstan, Prof. Dr. Albert Gilmutdinov**

September 21, Wednesday

Science and Research in Tatarstan

09:30 **The Federal University of Kazan: Scientific Projects and International Cooperation**
Rector Prof. Dr. Ilshat Gafurov
KFU Conference Hall

10:15 **The National Research University Kazan State Technical University: Scientific Projects and International Cooperation**
Rector Prof. Dr. Yuriy Gortyshov

11:00 **Coffee Break**

11:30 **2nd Plenary Lecture**
"Cornerstones of a Sustainable Climate Policy"
Dr. habil. Helmut Weidner, Social Science Research Center Berlin
- Discussion -

13:00 **Lunch**
Restaurant "Sytyj Papa"

14:15 **3d Plenary Lecture "Nanoscopic Materials for Energy Conversion and Medical Applications"**
Prof. Dr. Eckart Rühl, Freie Universität Berlin
- Discussion -

15:15 **Coffee Break**

15:45 **Short Lectures of Young Researchers**
Chairman: Prof. Dr. Eckart Rühl, Freie Universität Berlin

- Mr. KOROTKIKH, Aleksandr: "Hydrogen Energetics - Lost Alternative?"
- Mr. FRIEDRICH, Dennis: "Influence of the electrolyte components on electron kinetics in a dye-sensitized solar cell"
- Mr. DUBINA, Igor: "Cost Control Management in the RF Fuel and Energy Complex: Problems and Mechanisms"
- Ms. EPIKHINA, Raisa: "'Multistep' electricity pricing for residential users: A case study of China"
- Mr. KOPP, Sandu-Daniel: "Security of European Gas Supply"
- Ms. SVENSKAYA, Julia: "Polyelectrolyte core-shell structures for photodynamic dyes encapsulation"
- Mr. STUMPF, Patrick: "XAS and XMCD Studies on Novel Iron Oxide Nanoparticles as Magnetic Resonance Imaging (MRI) Contrast Enhancers"
- Ms. AKHMETSHINA, Juliana: "Comparative analysis of social •nd personal competence development in the context of energy system"
- Ms. MAKAROVA, Svetlana: "Legal and organizing problems of using energy sources for domestic needs in Russia"

18:15 **Dinner**
Hotel Marriott

19:15 **Workshop: "Sit together with the Presidents" Intensification of Scientific Cooperation between Russia and Germany**

- Prof. Dr. Peter Funke, Vice-President of the DFG
- Prof. Dr. Max Huber, Vice-President of the DAAD

Chairman: Dr. Gottfried Gügold, Freie Universität Berlin
Hotel Marriott

September 22, Thursday

Organization of Science and Research in Germany

09:00 **DWIH - Deutsches Haus für Wissenschaft und Innovation / German Centre for Research and Innovation**
Dr. Gregor Berghorn, Managing Director KFU
Conference Hall

09:15 **DFG - Deutsche Forschungsgemeinschaft / German Research Foundation "Promoting Research Careers"**
• Dr. Jörg Schneider, Director of Division of International Affairs, DFG Bonn

"Fostering German-Russian Cooperation"
• Dr. Christian Schaich, Director International Cooperation CIS/Russia, DFG Berlin

10:00 **Max Planck Society and Russia - potentials and possibilities**

• Dr. Per Brodersen, Scientific Officer, Division International Relations, Berlin
• Dr. Tulio Rocha
Fritz-Haber-Institute Berlin

10:45 **Coffee Break**

11:15 **4th Plenary Lecture: DFG-Emmy-Noether-Groups "From Functional Polymers towards Organic Solar Cells"**

Prof. Dr. Sabine Ludwigs, University of Stuttgart
- Discussion -

12:15 **5th Plenary Lecture: DFG-Research-Training-Groups "Micro Energy Harvesting"**

• Dr. Frank Goldschmidtböing, University of Freiburg
- Discussion -

13:00 **Lunch**
Restaurant "Sytyj Papa"

14:15 **6th Plenary Lecture: "What we know about Energetic in Cosmic Space"**
Prof. Dr. Nail Sakhibullin,
Kazan Federal University
- Discussion -

15:15 **Coffee Break**

15:45 **Short Lectures of Young Researchers**
Chairman: Prof. Dr. Nail Sakhibullin,
Kazan Federal University

• Mr. GÖKE, Sebastian: "A new Combustion Technology for High-Efficiency, CO2-free Gas Turbines"
• Mr. KASHEZHEV, Aslan: "Nuclear energy and safety"
• Ms. KURCHEVSAKYA, Aleksandra: "Energy security in the Arctic as a basis for sustainable development"
• Mr. BRAUN, Christoph: "The block copolymer films for applications in organic cells"
• Ms. KLIMOVA, Viktoriya: "The Sodium-cooled Fast Breeder Reactor as a Prior Direction of Nuclear Energy Development in Russia"
• Mr. TIMOFEEV, Aleksandr: "Peat: raw material reserves, types of fuel and prospects for usage"
• Mr. LINK, Steffen: "Block copolymer thin films as templates for nanostructured hybrid solar cells"
• Mr. DMITRIEV, Sergey: "The usage of an alternative energy source-wind generator at retail establishments of LLC Tatneft"
• Mr. TONKOSHKUROV, Igor: "Analysis of the Alternative Energy Sources Development"

18:00 **Dinner**
Hotel Marriott

19:00 **Social Programme: Bowling party in the Park House**
Park House

September 23, Friday

The Intermediary Organizations in Germany

09:00 **DAAD - Deutscher Akademischer Austauschdienst / The German Academic Exchange Service in Russia**
Dr. Gregor Berghorn, Head of DAAD-Office in Moscow
KFU, Conference Hall

09:40 **The Alexander von Humboldt-Foundation**
Dr. Petr Stefanovich, Representative of the Humboldt Foundation in the DWIH-Moscow

10:20 **Die Freie Universität Berlin**
Tobias Stüdemann, Head of the Liaison Office of Freie Universität Berlin (Moscow)

11:00 **Coffee Break**

11:30 **7th Plenary Lecture: "Advanced Functional Materials for Highly Energy Efficient Systems"**
Prof. Dr. Vladimir Dyakonov, University of Würzburg
- Discussion -

13:00 **Lunch**
Restaurant "Sytyj Papa"

14:00 **8th Plenary Lecture: "Potentials of Spintronics in the Development of Energy Conservation Technologies"**
Prof. Dr. Ilgiz Garifullin, Zavoisky Physical-Technical Institute, Kazan

15:15 **Coffee Break**

15:45 **Short Lectures of Young Researchers**
Chairman: Prof. Dr. Vladimir Dyakonov, Universität Würzburg

- Ms. KORNEEVA, Alina: "Supercomputing Technologies for High-Tech Industries"
- Mr. EROSHENKO, Stanislav: "Scientific challenges of distributed generation. Siting and sizing of distributed generation."
- Mr. CHYRKIN, Anton: "Subsurface Precipitate Enrichment in Laves-Phase Strengthened Ferritic Steel during Oxidation at 800°C"
- Ms. MURAVJEVA, Oksana: "Problems of Selling of Engineering Services in the Market of Electric Power Industry in Russia"
- Ms. PODVOISKAYA, Nataliya: "Atomic Energy: Pro et Contra (Sociological Analysis)"
- Mr. KOWITZ, Paul: "Environmental Capacity as a determinant of the Environmental Kuznets Curve (EKC) hypothesis"
- Mr. SOROKIN, Sergey: "Arctic as a source of energy for future generations (political aspect)."
- Mr. SCHNAYDER, Dmitrij: "Energy efficient control of street and building illumination

18:00 **Dinner, Free time**
Hotel Marriott

September 24, Saturday

09:00 **Short Lectures of Young Researchers**
Chairman: Prof. Dr. Kev Salikhov, Zavoisky Physical-Technical Institute, Kazan

- Mr. GAINOV, Ramil: "Nuclear-resonance (NR) spectroscopic methods, energy efficiency of mining industry"
- Mr. FAKHRULLIN, Ravil: "Microbial cells as versatile templates"
- Ms. YANCHUSCHKA, Zlatiza: "Economical validation of innovative energysaving device usage perspective for fuel-energy resources"
- Mr. LESHCHENKO, Konstantin: "Problems of technology and motivation in the use of renewable energy"
- Mr. ALFONSOV, Aleksey: "High-field electron spin resonance study of electronic inhomogeneities in correlated transition metal compounds"
- Mr. TVERDUNOV, Pavel: "Effectiveness of UV-LEDs for water treatment"
- Mr. DOLGIKH, Pavel: "Light technologies and their role in a modern society"
- Ms. USOVA, Galina: "Thermochemical conversion of domestic fuels"
- Ms. LEDENEVA, Marina: "Equal exchange between countries from a position of the energy theory of value"
- Mr. YANCHENKO, Sergey: "Harmonic distortion injected by personal computers"

KFU, Conference Hall

11:00 **Coffee Break**

11:30 **Panel Discussion:**
"Prospects for young researchers: What can be expected of Research Organizations?"

Invited panelists:
- Dr. Jörn Achterberg, DFG Moscow
- Dr. Gregor Berghorn, DAAD Moscow
- Young Russian and German Researchers

Chairpersons:
- Dr. Liliya Bondareva, Deputy Chairman of the Council of the Russian Union of Young Researchers;
- Tobias Stüdemann, Head of the Liaison Office of Freie Universität Berlin, Moscow

12:50 **Closing remarks**
Dr. Gregor Berghorn, Managing Director DWIH Moscow

13:00 **Lunch**
Restaurant "Sytyj Papa"

14:00 **Technical questions**
Departure of Participants