

devoted to the energy aspects of the forest industries. At one it was indicated that the energy input of the industry itself to pulp and paper manufacture ranged from 5-35% in different countries, with a very much lower figure (5% only) for the input to the mechanical processing side. Sweden, again, is a leader in examining how these figures could be improved by more efficient use of forest waste: one recent estimate gives 50 million m<sup>3</sup> of residues consumable

as fuel if not partially recovered for other processing, for every 60 million m<sup>3</sup> of commercial round wood produced annually.

Again, in Finland it is estimated that small sized wood, stump/root systems and other forest waste could provide 3.6 million tons oil equivalent a year, with another 0.8 mtoe depending on the market for certain hardwood products. Timber industries, faced with rapidly rising energy

costs from conventional sources, are examining new ways of using their own waste products, either by direct combustion or through conversion into gas or liquid fuels. An advantage is that wood is not carcinogenic and is low in both nitrogen and sulphur. According to one ECE report, forest product industries can and should become energy independent soon, later supplying surplus biomass to other users.

Peter Collins

## Poland calls for wider research cooperation . . .

International cooperation at every level — from pure academic research to industrial design and implementation — is essential if a country's research potential is to develop to its full capacity. So Jan Mazurkiewicz, Director of 'Export and Economic Relations with Abroad' of the Polish Ministry of the Machine Industry told *Nature* recently. He was summarising the significance of "Poland's Technology, 1979" a series of seminars and technical exhibitions held last week in London, Manchester, Birmingham, and Coventry.

The close integration of research with industry is a basic feature of Polish planning. It was perhaps less familiar to some of the British participants, who seemed a little at a loss as to whether to expect learned discourses or sales promotion talks. For the event, sponsored on the British side by the Chambers of Commerce of the host cities, was the reciprocal or a similar British week in Warsaw last autumn, and represents one of the more positive results of Poland's large trade gap with Britain.

If trade between the two countries is to increase — and the state of the Polish economy makes this highly desirable — some new form of cooperation must be found. Recently, joint research and development projects, culminating in joint production for a third market, has increasingly been proposed on both sides as an attractive solution.

Any viable proposal for joint projects presupposes, that both sides know what the other has to offer. "A symposium means the meeting of people with like interests", Mr Mazurkiewicz explained. "So we chose our team very carefully — a couple of academicians, a test pilot, two plant engineers, an administrator, and so on. We looked for a good variety, for people with open minds, with whom there could be a point of contact."

The subjects, which ranged from medical electronics to machine tools and from computer software to agricultural aviation, were selected by the Polish side as fields where they felt they had something valuable to offer. Inevitably, in the discussion of any cooperation projects, sooner or later the problem of strategic military embargoes crept in. These, however, were peripheral, and in one instance, Jacek Szporoko of "Unitra-

Elektron" joked that the strategic embargo of the early 1960s had indirectly led to Poland's present expertise in semiconductor technology.

The close links between Polish research and industry meant that the Polish team could include lecturers of considerable international standing. Andrzej Radziminski (software and computer services) is a member of the Advisory Committee for Informatics Projects of the International Bureau for Informatics Dr Tadeusz Zak, who lectured on the Polish technological equipment industry, is a member of the Comecon Plenipotentiary Committee for Corrosion Problems, and Dr Halina Leszczynska (industrial sulphur processing) was closely involved in the development of granulated sulphur. This is free of the health and environmental hazards that had been closing more and more ports throughout the world to sulphur in its traditional powder form.

Dr Leszczynska is a member of the Committee of Chemical Sciences of the Polish Academy of Sciences, and, as such, represented a field which, she said, is always in the "top three places of research investment", due to its "importance in the

national economy". She was particularly optimistic about the outcome of the week. "There are already a lot of people doing joint research at post-graduate level", she said. "What this week has done is to provide new direct contacts at the development level."

Several members of the Polish team, in informal discussions, suggested that joint industrial and development projects should ideally be based on truly joint research, rather than bringing together the results of research at a late stage.

Although the symposium, was slanted rather towards the industrial end of the research and development spectrum, the lectures from time to time revealed interesting sidelights on Polish research structure which would undoubtedly have to be taken into account in the planning of any joint research. Who would have guessed — until test pilot Wieslaw Mercik pointed it out — that the Warsaw Aviation Institute does no work at all on whole-body helicopter design, but is simply responsible for testing the aerodynamic and performance characteristics of designs produced in the factory design offices?

Vera Rich

## . . . while the East Germans must wait for a trade agreement first

THE German Democratic Republic, which celebrated its 30th anniversary recently, is a country where, according to Dr Lutz Buschendorf, First Secretary (Science and Technology) of the GDR Embassy in London, every single worker is to some extent involved in science. Unfortunately, he said, so far scientific cooperation between the UK and the GDR has not developed to the extent one might have hoped. The reason, from the East German point of view, is the "unwillingness" of the UK to sign a cooperation agreement in which science and technology would not be linked to trade.

At present, technological cooperation comes under the Joint Agreement, originally drawn up in 1973, in which the British side comes under the aegis of the Department of Trade. This is the standard situation for all UK cooperation deals with Eastern Europe. The involvement with trade has a two-fold basis. Firstly, from the

beginning, the UK felt that if the agreements were to bring genuinely mutual benefits, then some kind of counter-trade would be needed to off-set a predominantly one way, West to East flow of technology. Secondly, the administration of the agreements by the Department of Trade (via a special technology unit) is a result of the way the ministry of technology was dismantled.

To the East Germans, however, the link with trade constitutes a major psychological block. When the then UK Secretary of State for Trade, Edmund Dell, visited the GDR some three years ago, he stressed that under existing economic conditions the trade turn-over between the UK and the GDR could well be doubled. Some Germans seem to have taken this as a direct challenge to their thesis that increased scientific and technological cooperation should pre-date any major expansion of trade. "We want to make

cooperation more long-term", Dr Buschendorf explained. "Under the present agreement it is difficult to get the right partners for scientific cooperation".

From the German point of view, the situation was somewhat improved by the signing, last May, of an agreement for the exchange of scientists, between the Royal Society and the GDR Academy of Sciences. Otherwise, however, they remain intransigent that what they need is a separate cooperation for science. They do not even seem willing to discuss possible areas of cooperation until such an agreement is signed — even to suggest subjects, Dr Buschendorf felt, would be "premature". It is known, however, that the British side has put forward a number of concrete proposals for joint seminars and visits, in order to bring together specialists who could then discuss feasible cooperation programmes. Subjects in which Germans have indicated particular interest include industrial hydraulics and corrosion protection. So far, however, there has been no firm response.

The insistence of the GDR on keeping science and trade firmly separated seems a little incongruous in the light of its own science policy. This, according to the official hand-outs for the current anniversary, is based on "a close and desired connection" between research and "the tasks set in the national economy". Innovation and implementation are the keynotes, and workers at all levels are encouraged to suggest further possible improvements. There are close funding links between industry and basic research. The production of university graduates is also a part of state planning, and each student is provided with his or her future job at least a year before graduation.

Given an economic structure, where "all the planning of scientific and technological work is based on the requirements put on the development of the national economy", it is difficult to understand the Germans' reluctance at least to explore what can be done under the existing agreement. Many of the fields which have priority in the GDR research programme — environment, water pollution, energy and raw materials, computers, could provide considerable scope for joint work with the UK or other western countries.

Perhaps some part of the explanation may lie in a report produced last spring by the East Berlin Institute for Politics and Economics. The Institute team, it appears, was apprehensive that injudicious importing of licenses could harm indigenous research and development by turning the national research potential into a mere mechanism for the adaptation of foreign thinking.

So far, however, no negotiators have made any reference to this point of view, but, on the thirtieth anniversary of GDR statehood, have raised yet again their plea for a separate scientific agreement.

Vera Rich

## Soviet scientist proposes Siberian sites for nuclear power stations

Soviet nuclear power stations should be sited in remote regions of Siberia and the Far North, according to Academician Nikolai Dollezhai, a leading nuclear scientist, and Yurii Koryakin, a Doctor of Economic Sciences. Moreover, such power stations should take the form of large "nuclear energy complexes", each consisting of a number of power stations of "several tens of millions of kW capacity" together with fuel reprocessing plants, and possibly facilities for utilising nuclear byproducts.

This proposal, which the authors themselves admit is "radical", appeared in the September issue of *Kommunist*, the leading Party theoretical journal. Starting out apparently as an encomium of Soviet nuclear progress, the tone gradually becomes less optimistic, and, after outlining the setbacks and delays of the fast breeder programme, the authors openly tackle the environmental problems, hitherto dismissed by Soviet publicists as scare-mongering by capitalist oil interests. Reprocessing risks are particularly stressed, and bolstered by the assertion that basic reprocessing costs are "significantly" higher than originally estimated.

Still more costly, they imply, is the loss in the productive land and water resources. Some 60% of the Soviet population live west of the Volga river/Volga-Baltic canal

line. It is here, in the main area of industrial and agricultural production that it is currently proposed to site nuclear power stations. The annual water requirements of nuclear and thermal power-stations already exceed 100 km<sup>3</sup>, some 2 km<sup>3</sup> of which are "irreversibly" lost. To accommodate this water, by the end of the century, if current construction patterns continue, agricultural land sufficient to provide bread for "several million people" will have been sacrificed.

Dollezhai and Koryakin would not, they stress, cast any doubt on the "historical necessity" of nuclear energy. Without nuclear energy, they affirm "it is impossible to construct the energy basis of developed socialism".

Giant energy complexes in Siberia, they claim, might well prove to be more efficient as regards construction, operation, and the "utilisation of labour reserves". Environmental hazards would be removed to a safe distance, and those associated with the transport of fuel from reactor to reprocessing plant eliminated completely. Finally — and this might well be the point that would win over the decision makers — the proposed nuclear complexes could be integrated into the Soviet Union's most prestigious civil engineering project — the diversion of the Siberian rivers to replenish the arid south.

Vera Rich

## Physicist flown home to face charges

Franco Piperno, the Italian physicist who had asked for political asylum in France, was extradited to Italy last week. The extradition order was given a week in advance of its scheduled hearing to avoid demonstrations and rescue attempts.

Piperno, aged 36, was escorted from Sante prison at 7am to Le Bourget Airport where an Italian Air force plane took him to the small military airfield, Pratica di Mare, north of Rome. He was whisked to solitary confinement in the political wing of the modern Revibbia jail in Rome.

Students in Rome set fire to cars and buses to protest at Piperno's extradition from France and police fired volleys of tear gas in unsuccessful attempts to disperse the demonstrators.

Forty five counts of extradition ranging from stealing car license plates to armed insurrection and including offences against the highway code were rejected by the French Court of Appeal (as was a first extradition request) on the grounds that they were political in character and violated the 1870 extradition treaty between the two countries.

But the court released Piperno to the Italian authorities to answer charges that he had sheltered two men in whose homes Italian police had found guns allegedly

used in the abduction of Aldo Moro. Moro, one of Italy's political elder statesmen, was kidnapped and later killed by the Red Brigade guerrilla group in Rome after their attempts to exchange him for jailed comrades had failed.

Piperno had denied involvement in the Moro affair. His statement at the extradition hearing was: "Perhaps it is better this way. At least I will be able to confront quickly that which in Italy is called justice and to demonstrate that I was not involved in the Moro kidnapping and assassination."

In Paris, where Piperno had received widespread support, French commentators expressed dismay and anger at the extradition. Francois Mitterand, leader of the Socialist opposition, declared that the Socialist Party "deplores the fact that French judges have yielded to governmental pressures". And Philippe Boucher, writing in *Le Monde*, said: "It is plainly unreasonable to believe that Italy had no political interest in brandishing Piperno as proof of their determination to combat terrorism. No one can seriously maintain the contrary . . . The (judicial) method in this case is contestable, indeed unseemly. It is furthermore dangerous." □