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IAEA ACTIVITIES IN ASSISTING DEVELOPING COUNTRIES TO
IMPLEMENT AGENDA 21:
A REVIEW (1993 - 2001)
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IAEA Activities in Assisting Developing Countries to Implement Agenda 21
A Review (1993-2001)

Building national capacities to address priority sustainable development needs lies at the core of the IAEA's activities to assist its member states. In the period 1993 through 2001, the IAEA has supported over 800 technical cooperation projects, valued at over 200 million USD in support of various clusters of Agenda 21 (*see attached table*). More than 380 training courses were held with a total of over 5000 participants; 3000 fellows were provided with more intensive training support. These projects assisted the 1850 participating institutions to meet their respective national Agenda 21 priorities.

Besides the IAEA's leading role in strengthening capacities in the fields of radiation waste management and radiation safety and protection, the IAEA also supports the use of nuclear techniques to solve priority sustainable development challenges. Examples include the sterile insect technique as a component of integrated pest management programmes, the assessment of radionuclides and other pollutants in the environment, as well as the use of isotopic techniques to assess groundwater resources.

Cluster 18: Chemicals and Waste

A cornerstone of the IAEA's support of Agenda 21 are those activities relating to Chapter 22 "Safe and Environmentally Sound Management of Radioactive *Wastes* (*IAEA is the task manager for this chapter.*)

Quite a few developing countries use nuclear medical techniques both for diagnostics and for treating diseases such as cancer. Other non-electric applications of nuclear energy in developing countries include nutrition, agriculture, landmine detection, food safety, erosion and climate tracking, water resources (radioisotope hydrology and desalination), pollution control (e.g., nuclear techniques to reduce industrial stack emissions) and various industrial applications (such as weld inspection). An increasing number of developing countries also operate research reactors, with currently 79 operating reactors in developing countries.

These applications contribute to sustainable development, but they also generate low and intermediate level radioactive waste (and some spent fuel from the research reactors) that must be transported, stored and disposed of safely. To this end the Agency has developed "reference design packages" for waste storage and organizes both classroom training courses and practical demonstration courses to provide experience in the context of the general infrastructure available in the trainees' countries. From 1993-2001, 98 projects (total of 17 million USD) were carried out that strengthened the ability of countries to properly manage waste from nuclear power plants as well as from other sources (hospitals, research etc.) For example, an inter-regional project involving 20 countries, assisted countries in evaluating their waste management needs and then provided requisite training on the

selection and utilization of the appropriate waste management technologies within the necessary regulatory and management framework. This involved some of the 31 training courses (607 participants) and over 600 fellows that the IAEA supported in this cluster.

Most geological materials, such as coal or metal ores, contain radionuclides. These accumulate in final products, intermediate products or wastes. The Agency has been developing a database on NORM (Naturally Occurring Radioactive Materials) and contaminated sites. The aim has been to raise understanding in Member States so that more sustainable practices can be developed.

Cluster 5: Human Health

The IAEA's capacity building activities related to the human health cluster of Agenda 21 (180 technical cooperation projects valued at 51 million USD) have focused on, in particular, radiation safety and protection as well as combating communicable diseases; other relevant activities related to improving nutrition and the monitoring of pollution. 184 training courses with over 2600 participants (from over 400 institutes) underlined the activities in this cluster.

Assisting countries to develop the appropriate legal and regulatory framework, management practices as well as safety procedures for radiation safety and protection, are central to many IAEA projects. For example a regional project assisted Bolivia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Jamaica, Nicaragua, Panama and Paraguay in upgrading their radiation protection infrastructure. Based on individual country assessments, the IAEA assisted national authorities and institutes to improve: the legal and regulatory framework; the occupational, medical and environmental exposure control; the system of radioactive waste management; as well as a plan for handling radiation emergencies involving radioactive materials.

Molecular techniques using radionuclide tracers have proven to provide sensitive and rapid methods of infection diagnosis as well as for the detection of drug-resistant pathogens. One regional project involving: Kenya, Sudan, Tanzania, Zambia and Zimbabwe, provided assistance to strengthen the capacity of national health centres to utilize these cost effective techniques for better case management and to lower treatment costs when addressing malaria and tuberculosis.

Cluster 11: Atmosphere

The IAEA's projects related to atmosphere have concentrated on the monitoring and assessment of air particulate matter for such key information as source apportionment. The 14 IAEA projects (total of 2,318,370 USD) involved 41 institutions who benefited from 8 training courses (68 participants.)

A joint UNDP/IAEA project provided 13 countries in East Asia with the capacity to monitor and assess air particulate matter (PM10 and PM2.5) as well as source apportionment. This will

strengthen the ability of governments to determine necessary policy and regulatory measures and will eventually allow for the monitoring of the transboundary movement of pollutants.

An innovative project in Poland has provided national counterparts with the ability to utilize electron beam dry scrubbing technologies to clean flue gases from coal burning power plants reducing the SO₂ and NO_x emissions that have previously caused significant environmental damage.

Cluster 12: Land and Agriculture

From 1993 through 2001 the IAEA built capacity in partnership with over 500 institutes in 294 projects (total of 83 million USD) related to the land and agriculture cluster. 173 of these projects have focused on strengthening capacities to utilize the sterile insect technique as a component of integrated pest management, and on plant breeding to support sustainable agriculture efforts. Other activities have helped to prevent or reverse land degradation, for example by building soil organic matter and increasing soil fertility, or by fostering the appropriate use of fertilizers and better irrigation. 1240 course participants (102 training courses) and over 1000 fellows will utilize their newly gained knowledge to address their national land management and sustainable agriculture issues.

One project assisted the Tsetse and Trypanosomiasis Research Institute in Tanzania to establish the facilities and capacities needed to undertake a tsetse fly eradication campaign with efforts focusing on the eradication programme for Zanzibar Island. Surveillance and quarantine procedures were also introduced to prevent the re-establishment of the tsetse after eradication has been achieved.

Another project is assisting 7 countries (Morocco, Tunisia, Syria, Iran, Egypt, Pakistan, Myanmar) to utilize saline groundwater to grow plants on salt affected lands and produce forage and food on a sustainable basis. National institutes were not only enabled to assist farmers to productively use land that was previously marginal, but it also were able to contribute to national efforts to combat the advance of desertification.

Cluster 13: Oceans and Seas

An IAEA project worked to enhance the capabilities of Black Sea countries to respond to serious pollution problems, and in particular radionuclides. National laboratories in participating Black Sea countries were supported with training courses, sampling cruises and data evaluation exercises in order to be able to more accurately monitor and assess both radionuclide as well as other marine pollutants. This was one of the 27 technical cooperation projects (5,931,738 USD) that were carried out including 14 training courses (120 participants) and 79 fellows who received longer-term training.

Cluster 16: Freshwater

Isotopic techniques are valuable tools for assessing key resource parameters (groundwater recharge, water balances etc.) and conditions (tracing pollution, sediments etc.). One of the IAEA's 121 projects (28,878,268 USD) provided national counterparts in Ethiopia with the ability to assess the basis for the sustainable use of groundwater resources as part of an effort to develop a national plan for groundwater exploitation.

A regional project has provided 6 African countries with the capacity and technology to more accurately assess water recharge rates, water balances, flow and source measurements thereby providing decision makers with key data for making important resource use decisions. The project included 2 of the 34 training courses that the IAEA has conducted (total of 467 participants) in projects that support activities in this cluster.

Chapter 18 of *Agenda 21* addresses current and projected shortages of potable water, one of the most serious problems facing many developing countries. One potentially huge source of supply is desalinated seawater from the world's oceans, and one desalination option is desalination powered by nuclear energy. Interest in nuclear powered desalination is driven by the expanding global demand for freshwater, by concern about greenhouse gas (GHG) emissions and pollution from fossil fuels and by developments in small and medium size reactors that might be more suitable for desalination than are large power reactors. The Agency runs technical co-operation projects with interested Member States, provides through the International Nuclear Desalination Advisory Group (INDAG), the only regular, comprehensive, worldwide forum for the exchange of information on nuclear desalination technologies and programmes and has published software, guidebooks and analyses to help assess nuclear desalination options. By the end of 2000, fifty licenses had been granted for the Agency's Desalination Economic Evaluation Program (DEEP), a software package to assess the economics of nuclear desalination compared with fossil options and lay the basis for future case specific evaluations of national projects and studies.

Cluster 19: Energy and Transport

The IAEA's energy activities focus primarily on assisting developing country Member States to do the capacity building, training, analysis and planning that are an essential part of bringing energy to those who lack access, and improving the quality of energy services for everyone. As such, the IAEA's energy activities address directly the key role for energy in sustainable development identified by CSD-9.

Since 1993 several hundred developing country representatives have been trained in the use of the IAEA energy analysis tools and databanks. In addition, IAEA experts have assisted numerous Member States in a wide range of issues from individual technology assessment and full energy system studies to energy-environmental policy formulation. Training is carried out either through regional training courses where participants from developing countries receive in-depth exposure to particular planning or assessment tools, or through direct country assistance in the development of national case studies.

The latter are usually designed for national experts who have already participated in relevant regional training courses.

The IAEA's Co-Coordinated Research Programmes (CRPs) provide another mechanism for methodology transfer and training. Here research teams from different developing countries work together within a specific targeted research programme to, for example, analyze energy-environment policy issues, assess externalities, identify cost-optimal greenhouse gas mitigation strategies or address any other energy-environment problem relevant to their respective home countries using the same set of methodological tools. In each CRP, the work plan and guidelines are developed between the coordinator and the research teams during a kick-off Research Coordination Meeting (RCM). Thereafter, the research teams analyze their individually selected or collectively assigned tasks or problems. Research teams may contact the coordinator via email for further council during the course of the project. Periodically the teams report on their accomplishments to the other teams during RCMs. CRPs have a proven track record of providing for invaluable information exchanges and mutually beneficial experience sharing between developing countries. Since 1992, the IAEA has conducted CRPs in the field of energy-environment planning involving institutions/research teams, each with 3 participants on average, from developing countries.

Finally, the IAEA conducts regional and national workshops to provide further assistance to developing countries. These workshops address country or region-specific issues within the fields of energy-environment modeling, planning and policy analysis. On average, the Agency conducts three workshops per year in developing countries.

Some of the 23 training courses (505 participants) and 105 fellowships were also in renewable energy projects that provided capabilities to use isotope hydrology techniques to assess geothermal energy resources. A project in El Salvador taught counterparts how to obtain necessary technical information for evaluating the feasibility of proposed investments as well as data needed for developing environmentally benign operational procedures for existing geothermal fields.

Indicators for Sustainable Energy Development (ISED)

Section 40.6 of *Agenda 21* calls on "Countries at the national level and international governmental and non-governmental organizations at the international level [to] develop the concept of indicators of sustainable development in order to identify such indicators."

In late 1998 the Agency initiated a project on Indicators for Sustainable Energy Development (ISED). These are designed to help national policymakers to assess and monitor the contribution of energy to sustainable development in their countries, the impacts of energy on environment, economic and social development, and the inter-relationship among these. Other agencies that have affiliated themselves with ISED currently include the European Commission, the OECD International Energy Agency, the OECD Nuclear Energy Agency, the UN Department of Economic and Social Affairs (DESA), the UN Economic, Social and Cultural Organization (UNESCO), the UN Economic

Commission for Europe (UNECE) and the UN Environment Programme (UNEP). As a first step, representatives from these agencies and eight countries, including India and Pakistan, reviewed existing indicator sets and statistics in the energy field and together developed a set of 41 indicators. Twenty-three of the 41 are considered “core indicators”. This means they are relatively specific to energy (so energy consumption per capita is a core indicator while population growth is not) and, within that subset, are still essential for conveying a concise yet relatively complete picture of energy developments. The indicators were then field tested in fifteen countries, including Argentina, China, Cuba, Indonesia, Mexico, Pakistan and Turkey, to assess data quality and availability. The results were positive and were presented as part of an interim report at CSD-9. The next step is to apply the indicators at the national level in a systematic manner, thereby contributing to the development and implementation of sustainable energy development policies and programmes at the national level.

The IAEA with expertise in managing radioactive materials, has the lead within the UN system to develop an Indicator for Sustainable Development for Generation of Radioactive Waste. An indicator has been developed and made available for country testing. Additional work is ongoing to refine the indicator, since generation of radioactive waste alone is an insufficient measure of the impact on sustainable development. Agenda 21 places a high priority on making information related to sustainable development readily accessible.

Co-operation to improve cost-effectiveness, performance and safety of nuclear energy for those countries choosing nuclear energy

Concerning nuclear power technology, the IAEA facilitates the exchange of non-commercial information on improved advanced nuclear power plant designs, advances cooperative research in the field of nuclear power development, provides support to developing countries in planning and implementing nuclear power programmes, promotes nuclear power engineering and technology know-how and transfer, provides for the training and development of personnel for nuclear facilities, works towards the preservation of knowledge and competence in the areas of nuclear power engineering and technology, and provides technical cooperation and support on nuclear fuel cycle, transport and waste technology (covering raw materials for reactor fuels, spent fuel and radioactive waste). This includes assistance in building up and strengthening national nuclear regulatory agencies, national nuclear research organizations and infrastructures for radioactive waste management.

Overview of IAEA Technical Cooperation Projects (1993-2001) that Support Agenda 21 (draft)

Cluster	Subject	# of Proj.	% of Total	Budget in USD	% of Total	Afr	LA	INT	EUR	EA	WA	Model Projects	No. of Institutions	No. of Training Courses (TrC)	Particip in TrC	No. of Fellows
5	Health	180	22%	51,051,600	24%	42	51	6	37	27	20	11	489	184	2,657	834
10	Biotechnologies	21	3%	15,733,670	7%	2	6	0	6	4	3	2	74	8	83	83
11	Atmosphere	14	2%	2,318,370	1%	2	5	0	1	5	0	1	41	8	68	24
12	Land & Agriculture	294	36%	83,364,870	40%	91	62	10	20	81	30	16	569	102	1243	1,085
13	Oceans & Seas	27	3%	5,931,738	3%	5	1	1	10	6	2	2	82	14	157	79
16	Freshwater	121	15%	28,878,268	14%	41	39	1	9	19	12	11	298	34	467	265
18	Chemicals & Wastes	98	12%	17,225,396	8%	16	14	8	46	9	5	4	194	31	607	607
19	Energy & Transport	58	7%	5,478,491	3%	7	13	7	18	10	4	2	106	23	505	105
Total*		813	100%	209,982,403	100%	206	191	33	147	161	76	49	1853	381	5787	3,082

*Information on number of projects and budgets based on approved projects 1993-2001. This figure does not include the staff cost incurred through the Regular Budget of the Agency. The Regular Budget for the year 2001 was approx. US\$ 230 million.

AFR: Africa

LA: Latin America

INT: Inter-regional

EUR: Europe

EA: East Asia

WA: West Asia