# MAJOR PROGRAMME 1
# NUCLEAR SCIENCE AND TECHNOLOGY
### Summary of Regular Budget Resources for the Biennium

| | Subprogramme / Programme | 2001 Adjusted Budget | Expenditure incr/(decr) | % | 2002 estimates at 2001 prices | Expenditure incr/(decr) | % | 2003 estimates at 2001 prices | Price increase % | 2002 with price increase | 2003 at 2002 prices |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Overall Management, Co-ordination and Common Activities | 473 000 | 146 000 | 30.9 | 619 000 | 11 000 | 1.8 | 630 000 | 6.9 | 662 000 | 673 000 |
| | Total | 473 000 | 146 000 | 30.9 | 619 000 | 11 000 | 1.8 | 630 000 | 6.9 | 662 000 | 673 000 |
| A.1. | Engineering and Management Support for Competitive Nuclear Power | 2 536 000 | (81 000) | (3.2) | 2 455 000 | 2 000 | 0.1 | 2 457 000 | 7.0 | 2 627 000 | 2 629 000 |
| A.2. | Nuclear Power Technology Development and Applications | 1 898 000 | 4 000 | 0.2 | 1 902 000 | 1 000 | 0.1 | 1 903 000 | 7.1 | 2 037 000 | 2 038 000 |
| Programme A - Nuclear Power | | 4 434 000 | (77 000) | (1.7) | 4 357 000 | 3 000 | 0.1 | 4 360 000 | 7.0 | 4 664 000 | 4 667 000 |
| B.1. | Uranium Production Cycle and Environment | 420 000 | (32 000) | (7.6) | 388 000 | 7 000 | 1.8 | 395 000 | 7.5 | 417 000 | 424 000 |
| B.2. | Nuclear Fuel Performance and Technology | 552 000 | 35 000 | 6.3 | 587 000 | (76 000) | (12.9) | 511 000 | 6.6 | 626 000 | 548 000 |
| B.3. | Spent Fuel Management | 539 000 | (26 000) | (4.8) | 513 000 | (6 000) | (1.2) | 507 000 | 7.0 | 549 000 | 543 000 |
| B.4. | Nuclear Fuel Cycle Issues and Information Systems | 667 000 | (35 000) | (5.2) | 632 000 | 67 000 | 10.6 | 699 000 | 7.4 | 679 000 | 748 000 |
| Programme B - Nuclear Fuel Cycle and Material Technologies | | 2 178 000 | (58 000) | (2.7) | 2 120 000 | (8 000) | (0.4) | 2 112 000 | 7.1 | 2 271 000 | 2 263 000 |
| C.1. | Energy Modelling, Databanks and Capacity Building | 1 333 000 | 14 000 | 1.1 | 1 347 000 | (10 000) | (0.7) | 1 337 000 | 7.2 | 1 444 000 | 1 434 000 |
| C.2. | Energy-Economy-Environment (3E) Analysis | 1 288 000 | (143 000) | (11.1) | 1 145 000 | 14 000 | 1.2 | 1 159 000 | 6.6 | 1 220 000 | 1 234 000 |
| Programme C - Analysis for Sustainable Energy Development | | 2 621 000 | (129 000) | (4.9) | 2 492 000 | 4 000 | 0.2 | 2 496 000 | 6.9 | 2 664 000 | 2 668 000 |
| D.1. | Nuclear and Atomic Data | 2 210 000 | (26 000) | (1.2) | 2 184 000 | 3 000 | 0.1 | 2 187 000 | 6.5 | 2 327 000 | 2 330 000 |
| D.2. | Research Reactors | 699 000 | 59 000 | 8.4 | 758 000 | 1 000 | 0.1 | 759 000 | 5.7 | 801 000 | 802 000 |
| D.3. | Nuclear Research Facilities and Instrumentation | 2 819 000 | (138 000) | (4.9) | 2 681 000 | - | - | 2 681 000 | 5.2 | 2 820 000 | 2 821 000 |
| D.4. | Maintenance of Knowledge in Nuclear Science and Technology | 1 983 000 | 164 000 | 8.3 | 2 147 000 | - | - | 2 147 000 | 2.9 | 2 210 000 | 2 210 000 |
| Programme D - Nuclear Science | | 7 711 000 | 59 000 | 0.8 | 7 770 000 | 4 000 | 0.1 | 7 774 000 | 5.0 | 8 158 000 | 8 163 000 |
| Major Programme 1 | | 17 417 000 | (59 000) | (0.3) | 17 358 000 | 14 000 | 0.1 | 17 372 000 | 6.1 | 18 419 000 | 18 434 000 |

## MAJOR PROGRAMME 1
## NUCLEAR SCIENCE AND TECHNOLOGY

**Core Activities Unfunded in the Regular Budget**

| | Subprogramme / Programme | 2002 Estimates Total | 2002 Estimates Less Extrabudgetary Funds Expected | 2002 Estimates Net Unfunded | 2003 Estimates Total | 2003 Estimates Less Extrabudgetary Funds Expected | 2003 Estimates Net Unfunded |
|---|---|---|---|---|---|---|---|
| 1. | Overall Management, Co-ordination and Common Activities | 110 000 | 110 000 | - | 110 000 | 110 000 | - |
| | Total | 110 000 | 110 000 | - | 110 000 | 110 000 | - |
| A.1. | Engineering and Management Support for Competitive Nuclear Power | 87 000 | 12 000 | 75 000 | 32 000 | - | 32 000 |
| A.2. | Nuclear Power Technology Development and Applications | 1 944 000 | 1 669 000 | 275 000 | 1 743 000 | 1 568 000 | 175 000 |
| Programme A - Nuclear Power | | 2 031 000 | 1 681 000 | 350 000 | 1 775 000 | 1 568 000 | 207 000 |
| B.1. | Uranium Production Cycle and Environment | - | - | - | - | - | - |
| B.2. | Nuclear Fuel Performance and Technology | - | - | - | 16 000 | - | 16 000 |
| B.3. | Spent Fuel Management | 16 000 | - | 16 000 | 8 000 | - | 8 000 |
| B.4. | Nuclear Fuel Cycle Issues and Information Systems | 432 000 | 432 000 | - | 447 000 | 447 000 | - |
| Programme B - Nuclear Fuel Cycle and Material Technologies | | 448 000 | 432 000 | 16 000 | 471 000 | 447 000 | 24 000 |
| C.1. | Energy Modelling, Databanks and Capacity Building | - | - | - | - | - | - |
| C.2. | Energy-Economy-Environment (3E) Analysis | 258 000 | 20 000 | 238 000 | 488 000 | 250 000 | 238 000 |
| Programme C - Analysis for Sustainable Energy Development | | 258 000 | 20 000 | 238 000 | 488 000 | 250 000 | 238 000 |
| D.1. | Nuclear and Atomic Data | - | - | - | - | - | - |
| D.2. | Research Reactors | 269 000 | - | 269 000 | 229 000 | - | 229 000 |
| D.3. | Nuclear Research Facilities and Instrumentation | 15 000 | - | 15 000 | - | - | - |
| D.4. | Maintenance of Knowledge in Nuclear Science and Technology | 13 000 | 13 000 | - | 13 000 | 13 000 | - |
| Programme D - Nuclear Science | | 297 000 | 13 000 | 284 000 | 242 000 | 13 000 | 229 000 |
| Major Programme 1 | | 3 144 000 | 2 256 000 | 888 000 | 3 086 000 | 2 388 000 | 698 000 |

## Major Programme 1: Nuclear Science and Technology
## Core Activities Unfunded in the Regular Budget (CAURBs)

### NET UNFUNDED

| Prog./Subprog./ Proj. Code | Description of CAURB | Priority | Amount in 2002 | Amount in 2003 | TOTAL US$ |
|---|---|---|---|---|---|
| **A.** | **NUCLEAR POWER** | | | | |
| **A.1** | **Engineering and Management Support for Competitive Nuclear Power** | | | | |
| ***A.1.02.*** | Develop recommendations and exchange of experience on I&C safety related software issues including tools to reduce software application costs. | Medium | 7 000 | 25 000 | 32 000 |
| ***A.1.03.*** | Convene a symposium on "Nuclear Power Plant Life Management". | High | 50 000 | - | 50 000 |
| ***A.1.03.*** | Prepare a technical document on NPP replacement costs. | Medium | 18 000 | 7 000 | 25 000 |
| **A.2** | **Nuclear Power Technology Development and Applications** | | | | |
| ***A.2.02.*** | Co-ordinate CRP on water cooled reactor properties for advanced systems with high thermodynamic efficiency. | Medium | 10 000 | 50 000 | 60 000 |
| ***A.2.02.*** | Carry out international standard benchmark exercises (TECDOC on ISP Thermalhydraulic codes prepared for publication). | Medium | 10 000 | 25 000 | 35 000 |
| ***A.2.02.*** | Prepare a technical document on progression of severe accidents in HWRs. | Medium | 10 000 | 10 000 | 20 000 |
| ***A.2.02.*** | Carry out studies on options for cost reductions for New NPPs. | High | 20 000 | 10 000 | 30 000 |
| ***A.2.03.*** | Prepare a technical document on management of sodium in LMFR dismantling (Na decommissioning). | Medium | 10 000 | 16 000 | 26 000 |
| ***A.2.03.*** | Investigate primary sodium pipe rapture event in LMFRs (Working material). | Medium | 10 000 | 14 000 | 24 000 |
| ***A.2.04.*** | Exchange information on HTGR applications and future prospects. | High | 15 000 | 10 000 | 25 000 |
| ***A.2.05.*** | Compile a status report on non-electrical applications of nuclear energy. | High | 20 000 | 20 000 | 40 000 |
| ***A.2.05.*** | Convene a conference on "Advances in Nuclear Desalination". | High | 135 000 | 10 000 | 145 000 |
| ***A.2.05.*** | Review nuclear desalination programmes and provide recommendations to the Agency (INDAG). | High | 35 000 | 10 000 | 45 000 |
| **A.** | **Programme Total** | | **350 000** | **207 000** | **557 000** |
| **B.** | **NUCLEAR FUEL CYCLE AND MATERIAL TECHNOLOGIES** | | | | |
| **B.2** | **Nuclear Fuel Performance and Technology** | | | | |
| ***B.2.03*** | Prepare a technical document with updated information on poolside inspection and repair of water reactor fuel. | High | - | 16 000 | 16 000 |
| **B.3** | **Spent Fuel Management** | | | | |
| ***B.3.01*** | Prepare a technical document with updated information on spent fuel treatment. | Medium | 8 000 | - | 8 000 |

## Major Programme 1: Nuclear Science and Technology
## Core Activities Unfunded in the Regular Budget (CAURBs)

## NET UNFUNDED

| Prog./Subprog./ Proj. Code | Description of CAURB | Priority | Amount in 2002 | Amount in 2003 | TOTAL US$ |
|---|---|---|---|---|---|
| ***B.3.02*** | Prepare a technical document with updated information on the influence of fuel design for high burnup and MOX fuel and the influence of advanced reactor operations on the storage of spent fuel assemblies. | High | 8 000 | 8 000 | 16 000 |
| **B.** | **Programme Total** | | **16 000** | **24 000** | **40 000** |
| **C.** | **ANALYSIS FOR SUSTAINABLE ENERGY DEVELOPMENT** | | | | |
| **C.2.** | **Energy-Economy-Environment (3E) Analysis** | | | | |
| ***C.2.01.*** | Co-ordinate a CRP on competitiveness of nuclear power in deregulated electricity markets. | High | 102 000 | 102 000 | 204 000 |
| ***C.2.03.*** | Co-ordinate a CRP on economic system analysis of advanced small and medium reactors for electricity generation and non-electric purposes. | High | 68 000 | 68 000 | 136 000 |
| ***C.2.03.*** | Make a comparison of advanced nuclear power systems with other energy options on the basis of life-cycle analysis. | High | 68 000 | 68 000 | 136 000 |
| **C.** | **Programme Total** | | **238 000** | **238 000** | **476 000** |
| **D.** | **NUCLEAR SCIENCE** | | | | |
| **D.2** | **Research Reactors** | | | | |
| ***D.2.01/17*** | Hold regional workshops (one per year) on generation of new users and marketing for research reactors. | Medium | 25 000 | 25 000 | 50 000 |
| ***D.2.01/5*** | Co-ordinate a CRP on research reactor core conversion to uranium molybdenum alloy fuel. | High | 60 000 | 35 000 | 95 000 |
| ***D.2.01*** | Updated information on technologies responding to the needs in Member States for fission radioisotope production in research reactors. | Medium | 8 000 | 13 000 | 21 000 |
| ***D.2.02*** | Provide advice and assistance as requested to research reactors planning modernization or refurbishment. | High | 68 000 | 68 000 | 136 000 |
| ***D.2.02*** | Hold regional workshops (one per year) on modernization of old research reactors. | High | 23 000 | 23 000 | 46 000 |
| ***D.2.03*** | Provide advice and expert services for shipment of research reactor fuel for off-site treatment and storage. | High | 57 000 | 57 000 | 114 000 |
| ***D.2.04*** | Prepare a document with guidelines for use of samples from cores of decommissioning or refurbishing reactors for studying ageing of irradiated materials. | Medium | 28 000 | 8 000 | 36 000 |

## Major Programme 1: Nuclear Science and Technology
## Core Activities Unfunded in the Regular Budget (CAURBs)

### NET UNFUNDED

| Prog./Subprog./ Proj. Code | Description of CAURB | Priority | Amount in 2002 | Amount in 2003 | TOTAL US$ |
|---|---|---|---|---|---|
| **D.3** | **Nuclear Research Facilities and Instrumentation** | | | | |
| ***D.3.01/5*** | Assess the potential Agency role of facilitating international co-operation in the use of high-energy accelerators for research, therapy and spallation neutron sources. | High | 15 000 | - | 15 000 |
| **D.** | **Programme Total** | | **284 000** | **229 000** | **513 000** |
| | **TOTAL MAJOR PROGRAMME 1** | | **888 000** | **698 000** | **1 586 000** |

**MAJOR PROGRAMME 1**
**NUCLEAR SCIENCE AND TECHNOLOGY**
**Core Activities Unfunded in the Regular Budget**

| **Outputs which will not be produced or which will be delayed or hindered if funding is not provided (see Net Unfunded column of the preceding CAURBs Table)** | | |
|---|---|---|
| **Programme A** | | |
| **Subprogramme A.1.** | *A.1.02.* | Guidance document on I&C software issues, including cost of modifications and tools to reduce application costs. |
| | *A.1.03.* | Symposium on significant developments and achievements in the field of NPP service life optimization, covering technical, economic, regulatory and social aspects. |
| | *A.1.03.* | Contribution of non-OECD country data to the expected update in 2003–2004 of a 1998 edition of a report on "Projected Costs of Generating Electricity". |
| **Subprogramme A.2.** | *A.2.02.* | Technical document on the results of a CRP on water cooled reactor properties for advanced systems with high thermodynamic efficiency. |
| | *A.2.02.* | Technical document presenting the input for, and the results of, the International Standard Problem exercise for thermo-hydraulics codes. |
| | *A.2.02.* | Technical document on progression of severe accidents in HWRs and a technical document on options for cost reductions for new NPPs. |
| | *A.2.03.* | Technical document providing feedback from fast reactor operation and decommissioning (sodium decommissioning) and a technical document analyzing primary coolant pipe rupture event in liquid metal cooled fast reactors. |
| | *A.2.04.* | Technical report on HTGR applications and future projects. |
| | *A.2.05.* | Status report on national activities on nuclear desalination. |
| | *A.2.05.* | Conference on “Advances in Nuclear Desalination”. |
| | *A.2.05.* | Recommendations by INDAG to the Agency on nuclear desalination programmes. |
| **Programme B** | | |
| **Subprogramme B.2.** | *B.2.03.* | Technical document with updated information on poolside inspection and repair of water reactor fuel. |
| **Subprogramme B.3.** | *B.3.01.* | Technical document with updated information on spent fuel treatment. |
| | *B.3.02.* | Technical document with updated information on the influence of fuel design for high burnup and MOX fuel and the influence of advanced reactor operations on the storage of spent fuel assemblies. |

| | | |
|---|---|---|
| **Programme C** | | |
| **Subprogramme C.2.** | *C.2.01.* | Technical document relating to CRP on competitiveness of nuclear power in deregulated electricity markets. |
| | *C.2.03.* | Technical documents relating to CRPs on economic system analysis of advanced small and medium reactors for electricity generation and non-electric purposes, and on comparison of advanced nuclear power systems with other energy options on the basis of life-cycle analysis. |
| **Programme D** | | |
| **Subprogramme D.2.** | *D.2.01/17* | Workshops aimed at improving awareness regarding the capabilities of RRs for a variety of applications among users in developing countries. |
| | *D.2.01/5.* | Development of uranium–molybdenum alloy fuel. |
| | *D.2.01.* | Information about technology of fission fragment radioisotope production. |
| | *D.2.02.* | Services on various aspects related to research reactors planning, modernization or refurbishment and workshops on modernization of old research reactors. |
| | *D.2.03.* | Advice and expert services for shipment of research reactor fuel for off-site treatment and storage. |
| | *D.2.04.* | Document with guidelines for use of samples from cores of decommissioning or refurbishing reactors for studying ageing of irradiated materials. |
| **Subprogramme D.3.** | *D.3.01/5.* | Compilation of information on new developments and new applications of accelerators, for improving waste management and energy production. |

## MAJOR PROGRAMME 1
## NUCLEAR SCIENCE AND TECHNOLOGY
### Other (UN and Member States) Extrabudgetary Requests

| | Subprogramme / Programme | 2002 Estimates | | 2003 Estimates | |
|---|---|---|---|---|---|
| | | UN Organizations | MS Requests | UN Organizations | MS Requests |
| 1. | Overall Management, Co-ordination and Common Activities | - | - | - | - |
| | Total | - | - | - | - |
| A.1. | Engineering and Management Support for Competitive Nuclear Power | - | - | - | - |
| A.2. | Nuclear Power Technology Development and Applications | - | - | - | - |
| Programme A - Nuclear Power | | - | - | - | - |
| B.1. | Uranium Production Cycle and Environment | - | - | - | - |
| B.2. | Nuclear Fuel Performance and Technology | - | - | - | - |
| B.3. | Spent Fuel Management | - | - | - | - |
| B.4. | Nuclear Fuel Cycle Issues and Information Systems | - | - | - | - |
| Programme B - Nuclear Fuel Cycle and Material Technologies | | - | - | - | - |
| C.1. | Energy Modelling, Databanks and Capacity Building | - | - | - | - |
| C.2. | Energy-Economy-Environment (3E) Analysis | - | - | - | - |
| Programme C - Analysis for Sustainable Energy Development | | - | - | - | - |
| D.1. | Nuclear and Atomic Data | - | - | - | - |
| D.2. | Research Reactors | - | - | - | - |
| D.3. | Nuclear Research Facilities and Instrumentation | - | - | - | - |
| D.4. | Maintenance of Knowledge in Nuclear Science and Technology | - | - | - | - |
| Programme D - Nuclear Science | | - | - | - | - |
| Major Programme 1 | | - | - | - | - |