MINUTES OF THE 23rd MEETING OF THE SCIENTIFIC ADVISORY COMMITTEE TO THE CABINET

1. The 23rd meeting of the Scientific Advisory Committee to the Cabinet (SAC-C) was held in the Committee Room óAô, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi ï 110 011, on Monday, the 25th of July, 2011 at 1030 hr.

2. The meeting was chaired by Dr. R. Chidambaram, Principal Scientific Adviser to the Government of India.

3. The list of participants is annexed **(Annexure-I)**.

4. The meeting commenced with a welcome address by the Chairman. Distributing First Day Covers for the International Year of Physics in 2005, he said that attracting young people to careers in science has been a focus for the Office of the Principal Scientific Adviser to the Government of India (PSAôs Office) and, during the International Year of Physics, the PSAôs Office had organized, quite successfully, a seminar on this subject in the Indian Institute of Technology Delhi, New Delhi. He added that attracting women to careers in science was of particular importance.

5. The Chairman then mentioned about the Rio+20 Regional Workshop for Asia and the Pacific, that was convened in Kuala Lumpur, Malaysia, during April 16-18, 2011, where he had presented comments on the ñContribution from Science and Technology to Sustainable Development and Green Economyò. He further said that the Members might like to peruse the Workshop Report and his said presentation, copies of which had been placed in the meeting folders.

6. The Chairman then introduced the agenda to the participants. He mentioned that as regards the agenda item No. 2 (M23A2), Dr. M. Viyayan ï who was the Co-Chairman of the Committee of Experts for Planning Synchrotron Radiation Sources (CoE) ï had not been able to attend the meeting because of his other pre-scheduled commitments on the same day. Even Dr. D.D. Sarma, Professor, Solid State and Structural Chemistry Unit, Indian Institute of Science (IISc), Bangalore, had also not been able to participate because of similar commitments on the same day. The Chairman, however, opined that with Dr. P. Balaram (Director, IISc, Bangalore) present in the meeting as a Member, any

questions related to the IISc participation, during the discussion on the said agenda item, could be responded to by him. He further added that the SAC-Cûs recommendation on this agenda item would be forwarded to the Chairman of the Planning Commissionûs Steering Committee for Science and Technology for the 12th five year plan, for being incorporated into that Committeeûs Report. He also said that a detailed mention for the need of a new synchrotron source had been made in the Report of the Steering Committee for Science and Technology for the 11th five year plan ï that had been chaired by him ï which was submitted in December, 2006 to the Planning Commission and was, subsequently, approved.

7. Dr. Krishan Lal, Member, then informed the SAC-C that on the 6th of July, 2011, the Department of Posts, Government of India, had finally released a stamp to commemorate Late Dr. D.S. Kothari on his 105th birth anniversary. This news was warmly welcomed by the SAC-C.

8. The Chairman then invited Dr. S.K. Sikka, Co-Chairman, CoE and a Member of the SAC-C, to make his presentation on the agenda item number 2.

9. Dr. S.K. Sikkaûs presentation ***(copy attached)*** gave the number of synchrotron source in the world (as on the 30th of June, 2011); technical details about the INDUS 2 and its beamlines; usage of foreign synchrotrons by Indian scientists; Indian owned/hired beamlines on foreign synchrotrons; the proposals of the IISc, Bangalore & the Saha Institute of Nuclear Physics (SINP), Kolkata to set-up new synchrotrons having energy ratings of 3-5 GeV and 6 GeV, respectively and the observations/ recommendations of the CoE. Those observations/recommendations are listed below:

i) Currently, the INDUS 2 is a 2nd generation source and is reliably operating at 2 GeV and 100 mA. Many beamlines have been commissioned. Possible experiments are beginning to be carried-out. The Raja Ramanna Centre for Advanced Technology (RRCAT), Indore, is making efforts to achieve the designed values of 2.5 GeV and 300 mA and introduce insertion devices to make it a 3rd generation light source.

ii) A viable community of users has been built-up by facilitating experiments at foreign light sources. At present, 4 beam lines at foreign synchrotrons are hired/owned by India. The CoE felt that no additional beamlines need to be acquired till these are made fully operational and used effectively.

iii) In spite of all the above, the CoE felt that there was a need for another (perhaps even two) state-of-the-art synchrotron source in India. It will take 10 years to construct one and the INDUS 2 will be 20 years old by then.

iv) The proposals of both the IISc, Bangalore and the SINP, Department of Atomic Energy, Kolkata, for this are preliminary in nature.

10. During the course of his presentation, Dr. Sikka informed the SAC-C that although Dr. M. Vijayan had not been able to participate in the meeting, the said recommendations had been concurred to by him.

11. The Chairman then invited comments of the Members on that agenda item, as well as on the presentation.

12. Dr. R.K. Sinha, Director, Bhabha Atomic Research Centre, Department of Atomic Energy, Mumbai, then made the following observations :

i) The recommendations summarized in Dr. S.K. Sikkaôs presentation were very comprehensive.

ii) A great deal of effort had been put into bringing the INDUS 2 to the level of operation it stood at today. The considerable success in bringing the INDUS 2 to its present level of operation was because of the efforts of all the scientists and engineers who had contributed to its design, construction and operation.

iii) In constructing a new synchrotron facility, indigenous technology should be used to the maximum possible extent : any idea of importing a whole new machine should be totally discouraged.

iv) The RRCAT, Indore, should be involved in the examination of any proposal for the construction of a new synchrotron, given the vast years of

experience it had gained in the design and construction of such machines (INDUS 1 and INDUS 2).

v) Even if there is a proposal to construct a new machine based largely on imported technology, care should be taken to ensure that the resultant machine is capable of handling the type of experiments which Indian scientists want to do, and should have the maximum possible indigenous content and should also be easily maintainable.

13. Dr. Milan K. Sanyal, Director, SINP, Kolkata and a Member of the SAC-C, informed the participants that during the period July 26 -27, 2011, the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, was scheduled to organize a Workshop on the use of the PETRA III, wherein 90 faculty members had already confirmed their participation. The SAC-C welcomed this development.

14. Dr. Krishan Lal then made the following observations:

i) It is welcome news that a new synchrotron facility was being planned to be set-up in India.

ii) The idea that any such new facility should be designed and built using indigenous technology is fully supported.

15. The Chairman opined that the Indian industry was now much more powerful than before. As an example, he cited the significant contributions made by the Indian Industry to the construction of the Large Hadron Collider.

16. Dr. Jamshed J. Irani, Director, Tata Sons Limited, Mumbai and a Member of the SAC-C, inquired as to how the Indian Industry could be involved in the design and the construction of the proposed new synchrotron facility. Dr. S.K. Sikka responded by saying that one could follow the example of the Department of Atomic Energy effectively utilizing the Indian Industry in the implementation of its nuclear power programme. In that context, the cost plus model, followed by the Department of Atomic Energy, had resulted in capability building in the country.

17. Dr. Milan K. Sanyal then made the following observations:

i) As regards the possibility of importing, as a whole, a new synchrotron facility of 6 GeV energy rating, the question did not arise since there were no suppliers of this kind of a machine world-wide. One can, nonetheless think of buying sub-systems from abroad, based on need.

ii) The American Photon Source (APS), the European Synchrotron Radiation Facility (ESRF), the Spring8 and the PETRA III are 6 GeV machines. If India wishes to join this league, then a corresponding financial investment would, obviously be required.

iii) Making a new 3 GeV machine would not serve much purpose; a high energy, high brilliance 6 GeV machine would definitely be more relevant for the Indian scientific community, because we are talking of a machine ten years from now, and the INDUS 2 is already a 2.5 GeV machine.

iv) The SINP has already discussed with the ESRF about a possible collaboration for the design and construction of the proposed new 6 GeV machine ï called the Indian Synchrtotron for Materials and Energy Research (ISMER). The ISMER will be based on modified ESRF technology.

v) The APS, the ESRF, the Spring8 and the PETRA III are also ready to help in designing the beamlines of the new facility, which the SINP/the Department of Atomic Energy wanted to be amongst the best in the world.

vi) The ISMER will have a circumference of 1400 meters.

vii) The Government of West Bengal has already committed the provision of 200 acres of land, and 20 MW of uninterrupted power supply, for the proposed new 6 GeV machine.

18. Dr. S.K. Joshi, Member, SAC-C made the following observations:

i) It would not be wise to recommend the setting-up of 2 new synchrotron facilities in the country because by the time any such facility comes-up ï which will be about 10 years from the date it is sanctioned by the Government of India ï its technology will be too old when compared to machines in the rest of the world.

ii) In order to ensure that India is at par with the rest of the world, a new 6 GeV machine will be a better option rather than a 3-3.5 GeV machine.

19. To this, Dr. Milan K. Sanyal clarified that since the diffraction limit had been reached, it may not necessarily mean that a machine which is commissioned 10 years from now will be that many years behind the other machines in the rest of the world.

20. After a further deliberation, the SAC-C decided as follows:

i) The proposals of both the SINP and the IISc will be sent to the Planning Commissionôs Steering Committee on Science and Technology for the 12th five year plan, with a recommendation to approve the funding for only one of them, as deemed fit by that Committee.

21. The Chairman then invited Dr. P. Balaram to make his presentation on Bio-medical Research: Convergence of Science, Engineering and Medicine (agenda item number M23A3).

22. Dr. P. Balaramôs presentation ***(copy attached)*** highlighted the definition of Synthetic Biology, and suggested the creation of a Bridging Institutional Framework at the Interface of Science, Engineering and Medicine, with the following goals:

- To foster clinical research strongly integrated with a science & engineering research environment.
- To be able to recruit and retain clinicians in an interdisciplinary academic environment.
- To provide opportunities for integrating MD and PhD research.
- To facilitate access to cutting edge technology for investigating real life clinical problems.

23. Dr. Balaramôs presentation focused largely on bio-medicine. He felt that research in bio-medicine would largely involve the creation of facilities, with clinicians using those facilities for doing R&D work whenever they wanted to.

24. The Chairman then invited the comments of Dr. P.N. Tandon, Emeritus Professor, All India Institute of Medical Sciences, New Delhi. Dr. Tandon then observed as follows:

i) It was his passion to read that had made him realize that ñSynthetic Biologyò was a fast up-coming area of research, with not much research work happening anywhere in India. This issue was, therefore, highlighted by him to the Chairman, who readily agreed to take up the subject for discussion in the SAC-C.

ii) India should definitely focus more scientific attention in different areas of Synthetic Biology.

iii) This view was strengthened by the fact that about 15 years ago, hardly any scientist in India was involved in stem cell research. He had, in fact, published a paper on embryonic stem cells in the ñCurrent Scienceò around that time, and the interest now in this field, not only in India, but also world-wide, was there for everyone to see.

25. The Chairman then enquired from Dr. M.K. Bhan, Secretary, Department of Biotechnology (DBT), New Delhi and a Member of the SAC-C, about whether it would be worthwhile to include the proposal for a new Institute on Synthetic Biology in the 12th plan proposals of the DBT. To this, Dr. Bhan said that instead of a new Institute, the DBT could foster research in Synthetic Biology in a cluster of existing Institutes and Universities. Dr. Vijayalakshmi Ravindranath, Professor and Chairman, Centre for Neurosciences, IISc, Bangalore and a Member of the SAC-C, agreed with this view-point of Dr. Bhan.

26. On another query of the Chairman, Dr. Bhan agreed that research on Synthetic Biology should be promoted in a big way in the country. He further added that for fostering this kind of research, new Centres, and not new Institutes, could be set-up in the existing scientific and academic institutes of the country.

27. Dr. S.V. Raghavan, Scientific Secretary to the Principal Scientific Adviser to the Government of India and the Member-Secretary to the SAC-C, then gave a background to the participants about how scientific interest in Synthetic Biology was nucleated in the

PSAôs Office by Dr. P.N. Tandon. He also spoke about how earlier research work of his had focused on the use of Infrared (IR) imaging for the detection of diseases such as breast cancer.

28. Dr. Arun Kumar Sharma, President, National Academy of Sciences, Allahabad, and a Member of the SAC-C, felt that the barriers between clinical research and other areas of biomedical research should be broken.

29. Dr. Ramakrishna Ramaswamy, Vice-Chancellor, University of Hyderabad, Hyderabad and a Member of the SAC-C, made the following observations:

i) A fairly large number of Institutes were working in the area of Synthetic Biology : to name a few, the Indian Institutes of Technology in Bombay and Madras.
ii) There are many other areas to look at for research in Synthetic Biology: bio-medicine is, probably, the most difficult of those areas.

30. Dr. Bhan suggested here that even Inter-University Centres could be set-up in the 12th five year plan for pursuing research in Synthetic Biology. The SAC-C welcomed this suggestion.

31. Dr. V. Sumantran, Scientific Consultant (Advanced Manufacturing), PSAôs Office and a Member of the SAC-C, then made the following observations:

i) How do we have access to mechanical systems for working at a cellular level?
ii) How do we build some of the building blocks for Synthetic Biology?
iii) Nano-biosensors is also a very important area of research.

32. The SAC-C then strongly recommended the supporting of the Synthetic Biology initiative by the various scientific organizations of the Government of India.

33. The agenda item number 4 (M23A4) was not discussed because Dr. V.M. Katoch, Secretary, Department of Health Research, New Delhi and a Member of the

SAC-C, was not able to attend the meeting. After due permission of the Chairman, Dr. B.K. Gairola, Director General, National Informatics Centre (NIC), New Delhi and a Member of the SAC-C, nonetheless, made the following observations, on behalf of the Secretary, Department of Information Technology (DIT), New Delhi ï who is an Invitee to all meetings of the SAC-C ï on that agenda item:

i) A Meeting on e-governance, with a special emphasis on e-health, was proposed to be convened by the Cabinet Secretariat on the 29th of July, 2011.

ii) As proposed by the Secretary, DIT, the presentation on Telemedicine could be integrated into the Report of the Planning Commissionôs Steering Committee on Communication, Information Technology and Information for the 12th five year plan.

34. The Chairman agreed with the above suggestion of Dr. Gairola and said that the telemedicine presentation will definitely be taken-up as an agenda item in the next (24th) meeting of the SAC-C.

35. The Chairman then requested Shri R.S. Mani, Scientist ôFô, NIC, New Delhi, to present the agenda item number 5 (M23A5). Shri Maniôs presentation ***(copy attached)*** highlighted the following:

- An introduction to the National Knowledge Network (NKN).
  - Key Highlights of the NKN.
  - Management overview.
  - Technical overview.
- Key NKN Services.
- Connectivity Status.
- National and International Collaborations of the NKN.
  - Garuda.
  - TEIN3.
  - Sectoral Networks Overlay.
- On conclusion of the final phase, the NKN shall have presence in more than 500 districts of India, with connectivity to major research and educational institutions.

The points of presence will be 31, the backbone links will be 89 and the edge links will be 1500+.

36. The representative of the Federation of Indian Chambers of Commerce and Industry (Shri Nirankar Saxena, Director) suggested that the NKN should be open to private industries also, to which the Chairman responded by informing that this was under consideration by the High Level Committee for the establishment of the National Knowledge Network (HLC), with the condition that its use is restricted to non-profit and academic matters. This news was welcomed by the SAC-C.

37. On a query of Dr. Milan K. Sanyal, Dr. S.V. Raghavan clarified that the connectivity of the NKN to Europe was being enhanced. He further added that core backbone links had hundred percent redundancy, with connections through 2 separate service providers, to ensure 24x7 up-time.

38. The SAC-C appreciated the progress made in the implementation of the NKN and took note of all the information provided, on its status, during the presentation.

39. The meeting then ended with a Vote of Thanks to the Chair, and to all the Members, Invitees and Special Invitees present, by the Member-Secretary.

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Annexure-I to the Minutes of the 23rd Meeting of the Scientific Advisory Committee to the Cabinet

Date : 25th of July, 2011
Time : 1030 hr (preceded by tea at 0945 hr)
Venue : Committee Room 'A'
Vigyan Bhawan Annexe
Maulana Azad Road
New Delhi – 110 011.

List of Participants

S.No.	Name, Designation & Organization	Status
1.	**Dr. R. Chidambaram**, Principal Scientific Adviser to the Government of India, 318 A, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi ï 110 011.	**Chairman**
2.	**Dr. Jamshed J. Irani**, Director, Tata Sons Limited, Bombay House, 24 Homi Modi Street, Fort, Mumbai-400 001.	**Member**
3.	**Prof. S.K. Joshi**, Vikram Sarabhai Professor & Honorary Emeritus Scientist, National Physical Laboratory, Dr. K.S. Krishnan Marg, New Delhi ï 110 012.	**Member**
4.	**Dr. S.K. Sikka,** Scientific Consultant (Strategic Systems), Office of the Principal Scientific Adviser to the Government of India and Homi Bhabha Professor, Bhabha Atomic Research Centre, 6th Floor, Central Complex, Trombay, Mumbai ï 400 085.	**Member**
5.	**Dr. Dinesh Singh**, Vice-Chancellor, University of Delhi, Delhi ï 110 007.	**Member**
6.	**Prof. A.N. Rai**, Vice-Chancellor, North-Eastern Hill University, Shillong ï 793 022.	**Member**
7.	**Prof. Ramakrishna Ramaswamy**, Vice-Chancellor, University of Hyderabad, P.O. Gachibowli, Hyderabad ï 500 046.	**Member**

8.	**Dr. R. K. Sinha,** Director, Bhabha Atomic Research Centre, Trombay, Mumbai ï 400 085.	**Member**
9.	**Dr. P. Balaram**, Director, Indian Institute of Science, Bangalore ï 560 012.	**Member**
10.	**Dr. Milan K. Sanyal**, Director, Saha Institute of Nuclear Physics, Department of Atomic Energy, 1/AF, Bidhan Nagar, Kolkata ï 700 064.	**Member**
11.	**Dr. V. Sumantran,** Scientific Consultant (Advanced Manufacturing), Office of the Principal Scientific Adviser to the Government of India, Door 7/1, Valli Ammai Aachi Road, Kotturpuram, Chennai ï 600 085.	**Member**
12.	**Dr. Juzer Vasi**, Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai ï 400 076.	**Member**
13.	**Dr. B. K. Gairola**, Director General, National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, A-Block, CGO Complex, Lodhi Road, New Delhi ï 110 003.	**Member**
14.	**Prof. Vijayalakshmi Ravindranath**, Professor and Chairman, Centre for Neurosciences, Indian Institute of Science, Bangalore ï 560 012.	**Member**
15.	**Dr. M.K. Bhan**, Secretary, Department of Bio-Technology, Block No. 2, CGO Complex, Lodhi Road, New Delhi ï 110 003.	**Member (Ex-officio)**
16.	**Dr. Shailesh Nayak**, Secretary, Ministry of Earth Sciences, Block No. 12, CGO Complex, Lodhi Road, New Delhi ï 110 003.	**Member (Ex-officio)**
17.	**Dr. T. Ramasami**, Secretary, Department of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi ï 110 016.	**Member (Ex-officio)**
18.	**Dr. Krishan Lal**, President, Indian National Science Academy, 2, Bahadur Shah Zafar Marg, New Delhi ï 110 002.	**Member (Ex-officio)**
19.	**Prof. Arun Kumar Sharma**, President, The National Academy of Sciences, India, 5, Lajpatrai Road, New Katra, Allahabad - 211 002.	**Member (Ex-officio)**
20.	**Dr. S.V. Raghavan**, Scientific Secretary to the Principal Scientific Adviser to the Government of India, 324 A, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi ï 110 011.	**Member-Secretary**

21.	**Shri P.V. Kumar**, Chairman, National Technical Research Organization, Block No.3, 4th Floor, Old JNU Campus, New Delhi ï 110 016.	**Invitee**
22.	**Dr. P.N. Tandon**, Emeritus Professor, All India Institute of Medical Sciences, Ansari Nagar, New Delhi ï 110 029. ***Current Address:*** 1. Jagriti Enclave, Delhi ï 110 092.	**Special Invitee**
23.	**Dr. P.D. Gupta**, Director, Raja Ramanna Centre for Advanced Technology, Department of Atomic Energy, P.O. CAT, Indore ï 452 014.	**Special Invitee**
24.	**Shri Nirankar Saxena**, Director, Federation of Indian Chambers of Commerce & Industry (FICCI), Federation House, Tansen Marg, New Delhi ï 110 001.	**Special Invitee**
25.	**Shri S. Chatterjee**, Scientific Consultant (Rural Technology Delivery), 329, Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi ï 110 011.	**Special Invitee**
26.	**Shri R.S. Mani**, Scientist ôFõ, National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, A-Block, CGO Complex, Lodhi Road, New Delhi ï 110 003.	**Special Invitee**
27.	**Shri Neeraj Sinha**, Scientist ôFõ, Office of the Principal Scientific Adviser to the Government of India, 326, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi ï 110 011.	**Special Invitee**
28.	**Dr. Ketaki Bapat,** Scientist ôEõ, Office of the Principal Scientific Adviser to the Government of India, 320, Vigyan Bhawan Annexe, Maulana Azad Road, New Delhi ï 110 011.	**Special Invitee**

Annexure-II to the Minutes of the 23rd Meeting of the Scientific Advisory Committee to the Cabinet

Date : 25th of July, 2011
Time : 1030 hr (preceded by tea at 0945 hr)
Venue : Committee Room 'A'
Vigyan Bhawan Annexe
Maulana Azad Road
New Delhi – 110 011.

Agenda

M23A1 *Opening remarks by the Chairman, SAC-C.*

M23A2 *A presentation of the Report of the Committee of Experts for Planning Synchrotron Radiation Sources (CoE), constituted on an advice of the SAC-C in its 18th meeting – Dr. S.K. Sikka, Co-Chairman, CoE and DAE-Homi Bhabha Chair Professor, Bhabha Atomic Research Centre, Mumbai.*

M23A3 *Bio-medical Research: Convergence of Science, Engineering and Medicine – Dr. P. Balaram, Director, Indian Institute of Science, Bangalore.*

M23A4 *National Knowledge Network and Telemedicine: R&D, Delivery, Medical Practice and Ecosystem – Dr. V.M. Katoch, Secretary, Department of Health Research, Ministry of Health and Family Welfare, New Delhi.*

M23A5 *An update on the National Knowledge Network – Shri R.S. Mani, Scientist 'F', National Informatics Centre, New Delhi.*

M23A6 *Any other item with the permission of the Chairman.*

M23A7 *Concluding remarks by the Chairman.*

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