

Strategic Plan for Africa

The African Light Source I (AfLS1) and AfLS2 Conferences had three major outputs: (1) a set of overarching statements, called the *Grenoble Resolutions*, that provide the *WHY* for an AfLS, (2) a *Roadmap* to guide future activities, and (3) the election of a fully mandated Executive Steering Committee of the AfLS Foundation, a legal nonprofit under South African law.

I. For the first output, we have the following AfLS1 *Grenoble Resolutions*:

- 1. Advanced light sources are the most transformative scientific instruments similar to the invention of conventional lasers and computers.*
- 2. Advanced light sources are revolutionizing a myriad of fundamental and applied sciences, including agriculture, biology, biomedicine, chemistry, climate and environmental ecosystems science, cultural heritage studies, energy, engineering, geology, materials science, nanotechnology, palaeontology, pharmaceutical discoveries, and physics, with an accompanying impact on sustainable industry.*
- 3. The community of researchers around the world are striving collaboratively to construct ever more intense sources of electromagnetic radiation, specifically derived from synchrotron light sources and X-ray free-electron lasers (XFELs), to address the most challenging questions in living and condensed matter sciences.*
- 4. The African Light Source is expected to contribute significantly to the African Science Renaissance, the return of the African Science Diaspora, the enhancement of University Education, the training of a new generation of young researchers, the growth of competitive African industries, and the advancement of research that addresses issues, challenges and concerns relevant to Africa.*
- 5. For African countries to take control of their destinies and become major players in the international community, it is inevitable that a light source must begin construction somewhere on the African continent in the near future, which will promote peace and collaborations among African nations and the wider global community.*

II. For the second AfLS1/AfLS2 output, we have the following summary **Roadmap**:

A. Short-Term Goals (within 3 years)

1. Train large numbers of African scientists, engineers, students and technicians in the design and utilisation of advanced light sources (AdLSs).
 - a. Create a database of researchers from African background, or with special inclination to support the AfLS, who have been involved in the strategy, design, construction, operation, maintenance or usage of AdLSs.
 - b. Identify AdLS research projects in progress or completed that are relevant to the health, economic, social and industrial reality of Africa.
 - c. Develop case economic and social studies by discipline and by industry related to the health, economic, social and industrial reality of Africa.
2. Enhance the existing community of AdLS users.
 - a. Secure funding to expand *LAAAMP*'s Faculty-STudent (FAST) Team AdLS training programme, which began increasing the utilisation of AdLSs in 2017.
 - b. Increase enrollment in the NSLS-II and INCREASE (increaseonline.org) online course on beamline techniques, which is available to the *LAAAMP* Community.
 - c. Seek increased funding to support the travel of users to AdLSs to perform their measurements.
 - d. Provide training in the writing of proposals for beamtime at AdLSs.
 - e. Offer twinning programmes for new users to collaborate with experienced users from different countries.
3. Establish formal partnerships with existing international AdLSs.
 - a. Encourage more African countries to emulate South Africa, which in 2013 signed a medium-term arrangement with the European Synchrotron Radiation Facility (ESRF) at 0.3% contribution to the budget.
 - b. Form African Consortia to become Collaborative Members at existing AdLSs.
 - c. Study the feasibility of establishing consortia to construct African multinational beamlines at existing AdLSs, perhaps with partners from other regions of the world.
4. Promote the involvement of industry.
 - a. Identify an industrial leader.
 - b. Identify industries and private organisations that already have invested in AdLSs around the world (mainly by building experimental beamlines) to promote partnerships with Africa.
 - c. Approach similar industries in Africa to explore the possibility of obtaining the same level of support/funding locally.
 - d. Identify a person from identified industries to serve on the AfLS Foundation Executive Steering Committee.

5. Obtain the support of international high-profile persons (VIPs) to support the AfLS.
 - a. Identify high-profile persons, such as Nobel Prize winners, Heads of high-ranking universities, writers, ecologists, and filmmakers, who are willing to support the AfLS.
 - b. Formalize an International Support Group of such high-profile persons to lobby African governments to collaborate in establishing the AfLS.
6. Build an AfLS public and media profile.
 - a. Identify a group of researchers willing to promote the AfLS in social media by publicising information on the impact the project would have in Africa.
 - b. Produce two AfLS videos of 3 minutes in length, with the first one targeting decision makers and the second one targeting the public at large.
 - c. Collaborate with Science programmes around the world to promote the AfLS.
 - d. Promote the AfLS among high-profile media representatives in Africa.
7. Promote outreach and communication around AdLS-based science.
 - a. Send representatives and advocate to Presidents and their Cabinets.
 - b. Publish and widely disseminate videos, brochures, other materials, and whenever appropriate, visits to Synchrotron facilities to educate government officials and the public about the impact that AdLSs could have on their socioeconomic and health well being.
8. Establish and enhance Africa's critical feeder infrastructures that empower AdLS science.
 - a. Micro Level
Collaborate with entities, such as the African Laser Centre (ALC, <https://www.africanlasercentre.net/>), to develop researchers' sample preparation and screening facilities.
 - b. Macro Level
Establish Regional Research and Training Centers
 - i. Northern region
 - ii. Western Region, such as X-TechLab (<https://www.xtechlab.co/>)
 - iii. Eastern Region
 - iv. Southern Region
9. Advocate for the AfLS Strategic Plan to African Heads of State and relevant governmental Ministries.
10. Develop an AfLS non-site specific Pre-Conceptual Design Report, which specifies a detailed scientific case for an AfLS along with its various components, including the accelerator complex, experimental beamlines and ancilliary facilities.

11. Develop a dynamic (always current) professional quality AfLS Website.
12. Spread fluency in English throughout the African continent, since English is the international language of science, technology and business.

B. Mid-Term Goals (within 5 years)

1. Continue all the Short-Term activities, as required.
2. Study the feasibility of constructing a latest generation AdLS, including costs, and appoint a Task Team approved by African governments to develop a detailed Business Plan and Governance Model for an AfLS.

To save time and money, this could be a clone of an existing 4th generation AdLS, such as MAX IV in Sweden or Sirius in Brazil.

C. Long-term Goals (5 years and beyond)

1. Continue all the Short- and Medium-Term activities, as required.
2. Complete an AfLS Technical Design Report that includes site selection, and when approved by a sufficient number of African governments, begin the construction of a latest generation synchrotron light source.

- III.** For the third AfLS1/AfLS2 output whose function is to drive the Roadmap forward, the AfLS1/AfLS2 participants and other interested parties cast online ballots and elected the Executive Steering Committee for an AfLS (<http://www.africanlightsource.org/organizational-chart/afls-executive-committee/>).

Summary Remarks

The *African Laser Centre* serves as an excellent model for Pan-African scientific and technological cooperation. It is important to note that the ALC called for the construction of a Pan-African advanced light source from its very beginning, when it developed its *2002 Strategy and Business Plan*, which specified a synchrotron light source as one of its long-term goals. The ALC is a nonprofit organisation, based in Pretoria, South Africa, and consists of over thirty laser laboratories from universities and other research and industrial institutions across the African continent. Officially launched in Johannesburg in November 2003 during a Ministerial Segment of the New Partnership for Africa's Development's (NEPAD) *Conference on Science and Technology for Development*, NEPAD declared the ALC to be one of its *Centres of Excellence*.