

Strategic Plan for South East Asia Including the Strategic Plan for the Siam Photon Source II

- I.** The Synchrotron Light Research Institute (SLRI), as the main AdLS in South East (SE) Asia, strongly believes the following:
- 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. A greater utilization of advanced light sources will promote peace and collaborations among nations in the region and the wider global community, and enhance university education, the training of a new generation of young researchers, the growth of competitive industries, and advance research that addresses issues, challenges and concerns relevant to region.*
- II.** For SE Asia, the SLRI proposes the following summary **Roadmap**:
- A. Short-Term Goals (5 years)**
1. Encourage the ASEAN member countries to gain experimental and practical experience from the existing advanced light source (AdLS) toward the future 3GeV AdLS called Siam Photon Source-II (SPS-II).
 2. Train large numbers of SE Asian scientists, engineers, students and technicians in the design and utilisation of advanced light sources (AdLSs).
 - a. Provide training courses, including experimental and theoretical aspects, to the ASEAN members.

- b. Create a database of researchers having an SE Asian background, or with special inclination to support the SE Asian region, who have been involved in the strategy, design, construction, operation, maintenance or usage of AdLSs.
 - c. Identify AdLS research projects relevant to health, economic, social and industrial reality implemented and developed under discipline and industrial bases in the SE Asian region, either the ones in progress or completed.
 3. Enhance the existing community of AdLS users.
 - a. Provide supporting activities to secure *LAAAMP* funding to expand the number of *LAAAMP*'s Faculty-Student (FAST) Team AdLS training programme, the utilisation of AdLSs has been increasing since 2017.
 - b. Increase enrolment in the NSLS-II and INCREASE (increaseonline.org) online course on beamline techniques, which is available to the *LAAAMP* Community.
 - c. Provide online training on research proposal writing for beamtime at the SLRI.
 - d. Offer twinning programmes for new users to collaborate with experienced users from different countries.
 4. Promote the involvement of industry.
 - a. Increase awareness on advantages from synchrotron application at the SLRI to industrial sectors.
 - b. Promote the involvement of regional industries in supporting the progress of the SLRI as the regional AdLS.
 - c. Encourage industries and private organisations to make investments in AdLSs around the world (mainly by building experimental beamlines) to promote partnerships with SE Asia.
 - d. Approach similar industries in SE Asia to explore the possibility of obtaining the same level of support/funding locally.
 - e. Promote industrial research with private sectors under the support of *LAAAMP*.
 5. Obtain the support of international high-profile persons (VIPs), such as Nobel Prize winners, Heads of high-ranking universities, writers, ecologists, and filmmakers, to support the advancement of AdLS science and technology in SE Asia.
 6. Build an AdLS public and media profile.
 - a. Identify a group of researchers willing to promote the utilisation of AdLSs in social media by publicising information on the impact that AdLSs would have in SE Asia.
 - b. Produce two AdLS 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 utilisation of AdLSs.
 - d. Promote the utilisation of AdLSs among high-profile media representatives in SE Asia.

7. Promote outreach and communication around AdLS-based science and technology.
 - a. Send representatives to advocate for enhanced utilisation of AdLSs to Heads of State and their Cabinets.
 - b. Publish and widely disseminate videos, brochures, other materials, and whenever appropriate, visits to the SLRI to educate government officials and the public about the impact that AdLSs could have on their socioeconomic and health wellbeing.
8. Establish and enhance SE Asia's critical feeder infrastructures that empower AdLS science.
 - a. Micro Level
Collaborate with various entities to develop researchers' sample preparation and screening facilities.
 - b. Macro Level
Establish regional research and training infrastructures
9. Develop a dynamic (always current) professional quality SLRI Website for existing and future ASEAN AdLSs information.

B. Long-Term Goals (5 years and beyond)

1. Continue all the Short-Term activities, as required.
2. The SLRI will be supported with funding and expertise for upgrading the SPS-II.
3. Promote utilization of 3 GeV synchrotron facility for industry, especially in the new economy base called EECi region.
4. Assist Mexico and Africa in designing and constructing their newly proposed AdLSs based upon receipt of further information, discussions, and mutual agreements.

Summary Remarks

With the excellent facilities available at the Synchrotron Light Research Institute, it welcomes all countries in South East Asia to both share experiences and seek full utilisation of the facilities for research and training purposes. This includes advocating for the enhancement of AdLS sample preparation infrastructures throughout the region, making greater use of the AdLS there and in other parts of the world, and assisting SLRI with funding and expertise to realize a strong SPS-II programme in the future.

Strategic Plan for the Siam Photon Source II (A 4th Generation Advanced Light Source)

The Synchrotron Light Research Institute (SLRI) is pursuing the Siam Photon Source-II (SPS-II) project to build the second synchrotron advanced light source (AdLS) in Thailand. It will have an ultra-low emittance storage ring, intermediate energy of 3.0 GeV, and a circumference of 321.3 meters by using double triple-bend achromats (DTBA) in the lattice. This will result in much brighter synchrotron radiation than that of the existing 1.2 GeV Siam Photon Source (SPS). SPS-II will accommodate up to 22 insertion device beamlines that can be applied to a variety of research applications, including industrial.

The project is currently being evaluated by Thailand's National Economic and Social Development Council, which is responsible for assessing major development projects that are relevant to the objectives of the country's economic and social development. The strategic location of the new AdLS is at the Eastern Economic Corridor of Innovation (EECi), Rayong, Thailand.

The SPS-II project has the following major objectives:

1. Establish an advanced synchrotron light source, which is a crucial scientific infrastructure for creating advanced technologies and innovation.
2. Create jobs and develop skilled labor during the construction process.
3. Promote large investments for economic growth and firmly and sustainably advance the development of the country following the *Thailand 4.0* economic model.
4. Be the leading synchrotron research facility in South East (SE) Asia.

The SPS-II project has the following Summary Roadmap:

1. Short-Term Plan (2017-2023)

- 1.1. Complete detailed design reports for the SPS-II initial phase, including the machine and 1st phase beamline.
- 1.2. Complete a detailed civil engineering design for the SPS-II infrastructure, building and utilities.
- 1.3. Begin the construction of the SPS-II.
- 1.4. Find local partners/industries to produce machine components and their prototypes, such as electromagnets and vacuum chamber.
- 1.5. Pursue human resource development.
- 1.6. Build local and international partnerships.
- 1.7. Encourage and increase the new users community in SE Asia.

2. Mid-Term Plan (2024-2030)

- 2.1. Continue all the Short-Term activities, as required.
- 2.2. Complete the SPS-II infrastructure, building, utilities, light source and 1st phase beamline.
- 2.3. Commission and open the facility for users.
- 2.4. Complete the detailed design for the 2nd phase beamline.
- 2.5. Enhance local research for academic and industrial users.
- 2.6. Encourage new users from SE Asia.
- 2.7. Obtain co-investment for new beamlines in the second phase.

3. Long-Term Plan (2031 forward)

- 3.1. Continue all the Mid-Term activities, as required.
- 3.2. Complete the 2nd phase beamline.

SLRI User Service Activities

To increase the number of Thai and ASEAN users for both SPS and SPS-II, the SLRI User Service Division annually conducts four main categories of activities: outreach programmes, workshops and trainings, meetings, and international programmes. The purpose of these user service activities is to strengthen the experimental and analytical skills of users and encourage them to achieve high-quality data leading to publishable results. The SLRI user service programmes are listed in detail below.

Outreach programmes

1. ASEAN Synchrotron Science School (annually)
2. Synchrotron Science Camp for Science Teachers (annually)
3. Synchrotron Radiation Applications (SRA) (periodically)

Workshops and trainings

1. ASEAN Workshop on Experimental Techniques, such as AWX20xx, AWIR20xx, AWXTM20xx
2. Experimental and user training

Meetings

1. User Advisory Committee Meeting
2. SLRI Annual User Meeting
3. XAS Users Meeting

International programme

1. LAAAMP's Faculty-Student (FAST) Team AdLS training programme
2. Newton Fund for *Joint Workshop for Skills and Industry Programme: Synchrotron and Large-Scale Facilities*

Summary Remarks

Thailand will soon have a 4th generation 3 GeV synchrotron light source, which will contribute to the long-term development of the country. Scientific knowledge, research, technology, development and innovation are the factors that are intensely driving the country forward. The use of scientific knowledge spawns many new technologies and innovations and never stops. It leads to solutions to challenging problems, reduces costs, and reduces imports from foreign countries. Moreover, it increases the potential for the manufacturing, service and social sectors to provide more value to the country. Thus, the SPS-II will increase the competitiveness of the country and the whole South East Asia region according to the *Thailand 4.0* model, linking the development of Thailand's and ASEAN economies with stability and sustainability. With its tremendous potential, the SPS-II will be an important step for Thailand to be one of the leading synchrotron research facilities in the region, along with other international leaders, such as Australia, Japan, China, Taiwan, and South Korea.