

Canadian Synchrotron Long-Range Plan (LRP) for 2025 to 2035: Project Outline

The development of a LRP is a dynamic, evolving process. This document represents project planning as of the version date.

Purpose

To develop a community-supported, comprehensive, specific, and realistic set of recommendations that will enable Canadian research that relies on synchrotrons to address major social and economic challenges and maximize benefits to Canada over the next decade and beyond.

Examples of other Canadian LRPs

- Canadian Astronomy Long Range Plan 2020-2030: https://casca.ca/?page_id=11499
- Canadian Subatomic Physics Long Range Plan 2022–2026: <https://subatomicphysics.ca/>
- Canadian Neutron Long-Range Plan for 2025 to 2035: <https://neutrons.ca/long-range-plan/>

Intended use of the Synchrotron LRP

The resulting LRP will serve as a single unified vision for the synchrotron community, providing recommendations that guide the community to act collectively to achieve it in the following ways:

- Institutions and individual researchers will use the LRP to speak with one voice to funders, policy makers, foreign partners, and other institutions, thus demonstrating coherency of the research community.
- The CLS will build a 10-year budget starting in 2027 on the recommendations of the LRP, which will be submitted to the CFI in 2026 as part of the development of new framework for funding Major Research Facilities (MRF).

Stakeholders in the Synchrotron LRP

- The Canadian Light Source: management and staff
- The Canadian Institute for Synchrotron Radiation
- Individual users from universities, industrial users, and government users (e.g. NRC, Agriculture & Agri-Food Canada)
- Other institutions with large interests in research using synchrotrons (e.g. U Sask, Ontario Synchrotron Consortium)
- Relevant Funders: CFI, NSERC, Innovation Saskatchewan
- Potential foreign partners: e.g. Advanced Photon Source (APS), Cornell High Energy Synchrotron Source (CHESS), Sirius at the Brazilian Synchrotron Light Laboratory

Scope of the LRP

The LRP will consider all user needs, covering multiple sectors (industry, government, and academic), disciplines (physics, chemistry, life sciences, health, engineering, cultural heritage), and all synchrotron techniques that Canadians require.

The LRP will consider multiple time frames:

- Short-term (present to 2027), e.g. establishing a sustainable operating funding mechanism for the CLS through the CFI-led MRF framework
- Medium-term (2027-2035), e.g. establishing a complete program for synchrotron radiation based on CLS and access to complementary capabilities abroad
- Long-term (beyond 2035), e.g. operation of new fourth-generation synchrotron capabilities

Topics will include:

- Foundational matters:
 - Articulate the benefits to Canada and Canadians from research that uses synchrotrons
 - Describe the scientific and societal drivers that will compel researchers to use synchrotrons in the coming decades
 - Describe the state of the research community, identifying strengths and opportunities for improvement [so that funders can be assured that the user community of major infrastructure will use it effectively over many years]
 - Communicate how the LRP planning process builds on prior community consultations
- Specific questions:
 - What Canadian research requires a fourth-generation synchrotron or other capabilities not available at the CLS, and what are the societal drivers for this research? Similarly, does Canada require an x-ray FEL, and how would that complement synchrotron capabilities?
 - Should such facilities be built in Canada, or should we partner with other countries for access? In either case, what is the recommended path forward (e.g. upgrade or build new)?
 - What is the best way to optimize access to synchrotron radiation at CLS and any foreign partnerships over the planning period, including while a fourth-generation facility is being built?
- General matters: In the interests of comprehensiveness, and responsiveness to community needs, the LRP could address any issues that community identifies as important to its success, such as:
 - issues of governance and management (e.g. the new CFI Major Research Facilities framework)
 - funding issues and other supports for research
 - EDI
 - science outreach
 - knowledge mobilization and technology transfer
 - HQP training
 - retention of HQP needed to build and operate synchrotrons

The LRP Process

The LRP will gather data on the state of the fields of research in Canada that rely on synchrotrons and identify Canadian needs and technology options for more advanced synchrotron capabilities

(Phase 1). These inputs will be used to solicit ideas for solutions that address those needs, evaluate them and produce the recommendations (Phase 2).

Phase 0 – Project Definition

1. Define organizational structure including the LRP Panel, organizing committee, working groups, and assign key roles
 - a. LRP organizing committee: determine its composition
 - b. Working groups: define the groups and select chairs
 - c. LRP Panel (organizing committee + working group chairs + at-large users)
2. Communicate with stakeholders to gain buy-in and cooperation, including securing initial resources
 - a. Create a Project Budget

Phase 1 – Gathering data: scientific requirements and options

1. Gather documentation from previous consultations (e.g. 2015 onward) and plans from synchrotron communities in other countries
2. Plan for launch of the LRP process at the CLS Annual Users Meeting (AUM) – October 22 at Waterloo (+ online days Oct 24-25)
 - a. Form subject-based working groups (e.g. quantum materials, soft matter and biomaterials, energy materials, structural engineering materials) and topic-based groups (e.g. synchrotron sources and instrumentation; student and post-doc issues).
 - b. Issue broad calls for input on the LRP topics and organize email and phone campaigns to solicit input from specific experts to fill input gaps. Individuals may submit their responses to specific questions or write their own free-form comments and advice on any topic of interest to the LRP.
3. Organize a virtual consultation session to assist the working groups in gathering input, which may include subject-area breakout discussion groups and topic-based presentations to generate further discussion and learn good practices from other research communities (LRP Consultation Session 2).
4. Create a survey of the community to gather quantitative information about topics such as user demographics, EDI barriers, availability of needed capabilities, ease of access to synchrotrons, factors that drive users' selection of a synchrotron, and importance of various user supports.
5. Gather inputs into a set of white papers and reports produced by the working-groups.

Phase 2 – Gathering and evaluating solutions

1. In phase 2, the working group on synchrotron sources and instrumentation will continue to operate in order to evaluate technology solutions in light of the scientific needs identified in Phase 1. Other working groups may be consulted in Phase 2. Hold consultation session to report findings from Phase 1 about needs and options, generate ideas for solutions and encourage participation in Phase 2 (LRP Consultation Session 3)

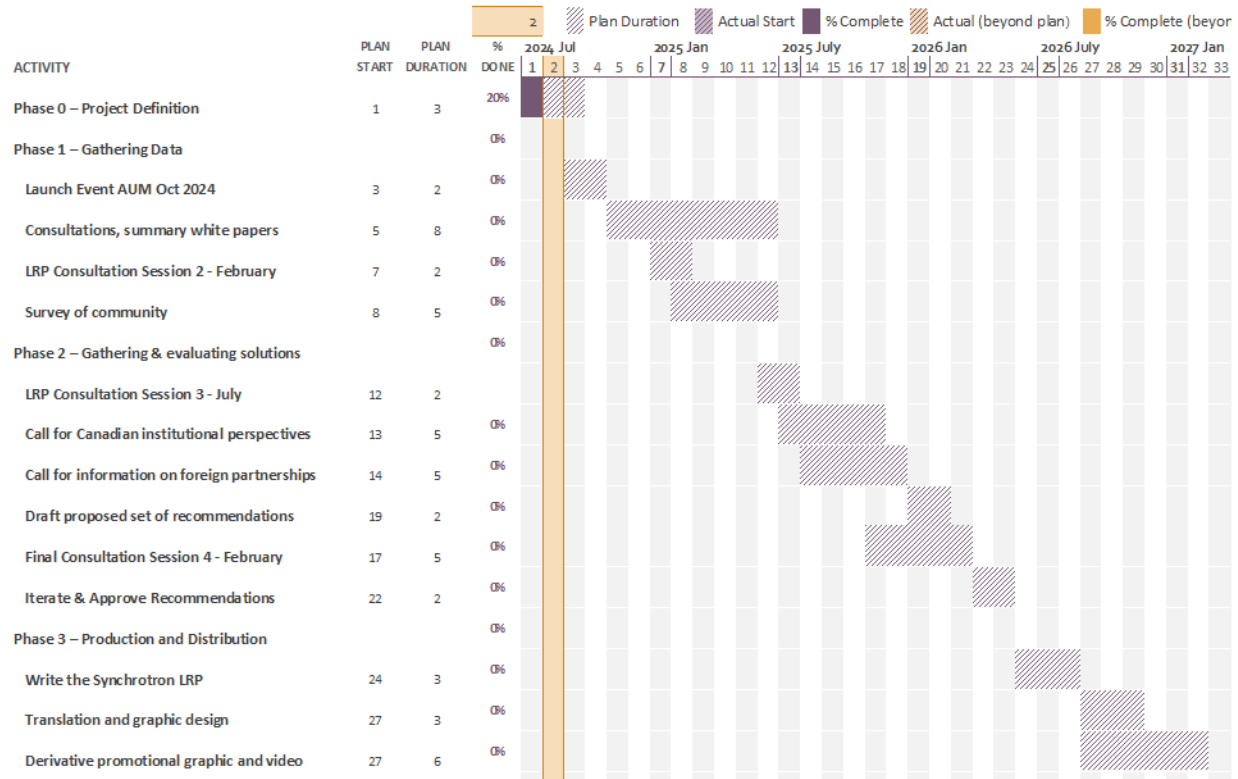
2. Call for individual and institutional perspectives on solutions that help address the identified needs (e.g. CLS can provide its own input at this stage concerning its capital and operational needs; a university might declare interest in upgrading the CLS or in hosting a 4th gen synchrotron, or leading large multi-institutional grants that would build up synchrotron user expertise in key areas such as CFREFs, CERCs, NFRF Transformation)
3. Call for advice and information from foreign synchrotrons about modes in which Canada could partner with them and thereby integrate access to their facility into a comprehensive program for Canadian access to synchrotrons.
4. Develop selection criteria and rubric for evaluating competing ideas (e.g. for technology solutions or foreign partnerships)
5. Engage the respondents from 1 and 2 as needed to further refine the ideas for solutions
6. Write a set of draft recommendations, with rationale, that is approved by the LRP Panel for distribution for further consultation.
7. Organize a national LRP consultation meeting (in-person with online participation) on the recommendations, with broad invitations to the user community and interested institutions, including government funders. Potential foreign partners could be invited to present opportunities for partnership. A university with strategic interest in hosting a 4th gen synchrotron could be a good candidate to host the meeting. (LRP Consultation Session 4)
8. Iterate the recommendations and approve the final recommendations for early distribution as needed.

Phase 3 – Production and distribution

1. Write the Synchrotron LRP
2. Translate the final manuscript to French and produce a graphic designed version of the LRP
3. (if desired) Produce derivative products, such as a news release, and promotional graphic and video content for distribution through social media

Timeline

Project Planner - Synchrotron LRP



Governance and management of the project

As the LRP is best positioned as an initiative of the synchrotron community (not one organization), a LRP Panel should be formed that is given final decision-making authority over the LRP recommendations and other content.

The LRP Panel should be supported by an organizing committee that meets every two weeks to make project decisions and oversee project progress. The organizing committee should be composed of key experts and professionals from the leading institutions and any external advisors. Additional synchrotron users from the LRP Panel may be added to the organizing committee as needed to provide balance.

Synchrotron users should comprise a majority of the LRP Panel. For example, the chairs (or co-chairs) of the subject-area working groups and topic-based groups (e.g. 7-15 people) combined with the organizing committee (4-6 people) could comprise the LRP Panel. The LRP Panel would meet as needed (e.g. once in 3 months on average) to provide high-level direction to the organizing committee.

The organizing committee must include professionals with time to dedicate to the project. Phases 1 and 2 will be heavily focused on the logistics and communications of the consultative processes. Phase 3 will need a writer to focus on the production of the document, whether as the lead writer or to synthesize the contributions from others into a coherent whole.