- Increase of PLTS system testing capacity

  Along with the increased use of PLTS, the PLTS system testing capacity owned by the Energy Technology Laboratory (B2TE), the Agency for the Assessment and Application of Technology (BPPT) needs to be improved their capacity. B2TE is located in Serpong, Tangerang Municipality, Banten Province is the only one testing laboratory for PLTS and its components owned by Indonesia that has been accredited with ISO / IEC 17025. B2TE has done testing for PV Module Components, Battery components, Battery Charge Regulator (BCR) components, and components of the DC lamp inverter. The equipment testing facilities owned by B2TE for PLTS and PLTS components testing are relatively limited, such as sun simulator, cycle test equipment, and electronic equipment. Those equipment components need to be increased in variety, quantity and capacity in order for B2TE to comply with international standards of IEC 61215 for photovoltaic modules testing. The testing equipment might be added with equipment for testing batteries, inverters, and others. Implementation of these activities under the coordination of BPPT can be done in the medium term of 3-5 years.
- Improvement of PV cell manufacturing laboratory

  In Indonesia, there are two PV cell production laboratories: laboratory of thin film under the Bandung Institute of Technology, Department of Physics and laboratory of crystalline under Laboratory Electronics and Telecommunications Research Center (PPET), Indonesian Institute of Sciences (LIPI). Both laboratories are located in Bandung of West Java Province. The ability of PV cells laboratory of PPET-LIPI is for polycrystalline solar cells/ new multi-crystal with maximum efficiency of 10% for dimensions of 5x5 cm^2. The low efficiency found is because it is carried out with limited and old enough (20-25 years) available equipment facilities and must be processed in the available laboratory room that is unclean. Despite the lower cell efficiency than that of commercial one, it can still be used for low-power PLTS such as for garden lighting, public lighting lamps or tower lamp. Silicon wafer (Si) used so far are imported from Germany with a dimension of 10x10 cm^2 and a minimum of 270 microns of thickness. Currently the thickness of Si wafers on the market is about 200 microns so that the facilities of available tools are no longer sufficient. To improve the efficiency of the cell it is required plasma etching and PECVD tools. In terms of human resources, PV cells laboratory of PPET-LIPI only owns as many as 8 employees and most of them enter retirement stage. Similar to the improvement of B2TE-BPPT cell laboratory, PPET-LIPI cell laboratory improvement can be done in coordination with LIPI. This activity can only be implemented after the determination of cell types are known so that it will be implemented in the medium up to long-term program.

RBCS Technology

- Installation of RBCS in the selected steel industry

  National steel production capacity reaches 8 million tons per year. The technology used is commonly conventional technology because the steel industry was built a long time ago in addition to its modifications within the framework of energy conservation is very limited. To that end, the potential use of RBCS in Indonesia is very potential, especially when considering the use of RBCS in other energy intensive industries. Selection of the steel industry for RBCS implementation will be determined based on the agreement between the Ministry of Industry and the Indonesian iron and steel industry association (AIBBI).

Installation of RBCS in other steel industries is still required even though the technology RBCS has already been mounted in one Indonesian steel industry. It is intended to accelerate the process of socialization of RBCS technology in other steel industries so that the energy conservation of the steel industries in Indonesia will be boosted. The amount of investment required depends upon the capacity of the furnace and the time required for installation up to commissioning which is about 5 months. During installation and commissioning of the RBCS, the involvement of research institutions such as BPPT, particularly the Technology Center for Energy Conversion and Conservation (PTKKE) and Energy Research Laboratory (B2TE) is required in order to maximize technology transfer activities of RBCS.

- Increase of control room and RBCS technology design capacity.
  As described earlier that PTKKE BPPT in 2011 has done test and analysis of small-scale (prototype) of RBCS technology. The design and engineering work of RBCS technology was carried out by BPPT engineers. To enhance human resources capabilities of BPPT in the design of RBCS and its control room, it would require the technology transfer from technology owners that are usually from abroad. It is expected that through this technology transfer to BPPT engineers, the implementation of RBCS for several types of industries (steels, ceramics, others) will be accelerated.

2.2.4.2. Project ideas for international support

PV Technology

- Development of National PV Industry at 50 MWp capacity (minimum)
  - ✔ Transfer technology needed is industrial PV cell (wafer to cell).
  - ✔ Capacity building required is the upgrading of human resources capability.
  - ✔ Financing aid preferred is in the form of grant and / or soft loans from donor countries.
  - ✔ Timeline is short-term (1-2 years).
  - ✔ Success indicators are the construction of a national PV industry and skilled engineers.
  - ✔ Domestic Partner is PT LEN Industri (Persero).

- Increase of testing capacity of PLTS system
  - ✔ Transfer technology needed is improvement of laboratory facilities according to standard IEC 61215, and addition of other components of equipment such as testing tools for batteries, inverters, and others.
  - ✔ Capacity building required is the upgrading the human resources capability.
  - ✔ Financing aid preferred is in the form of grant from donor countries.
  - ✔ Timeline is mid-term (3-5 years).
  - ✔ Indicators of success are upgraded PV testing facilities and their standardization according to laboratory standard of IEC 61215, as well as improvement of skilled engineers.
  - ✔ Domestic partners are PV research institutions such as B2TE-BPPT.

- Improvement of PV cell manufacturing laboratories (crystalline)
  - ✔ Transfer technology needed is industrial PV cell.
  - ✔ Capacity building required is improvement of human resources capability.