08/02/2021

# EU Erasmus+

# THREE Lanka Project

## (Training Hub for REnewable Energy Technologies in Sri Lanka)

Erasmus+

THREE Lanka
2021 - 2024

http://www.threelanka.com

## Skills Development for Sustainable Jobs

UNIVERSITY OF RUHUNA – SRI LANKA

Dr. Udayanga Galappaththi and Dr K J C Kumara

# Our Partners

The consortium for the THREE Lanka project is consisted with eleven partners and which include four European Universities, Five Sri Lankan Universities and one government body and one professional body in the energy sector






# Why this Project is So Important to Sri Lanka

## Future Skill Development Targeting Areas in Sri Lanka

- Information and Communication Technology
- Boat and Ship Building Industry
- Tourism
- Renewable Energy ……..

## Based Concept of THREE LANKA project

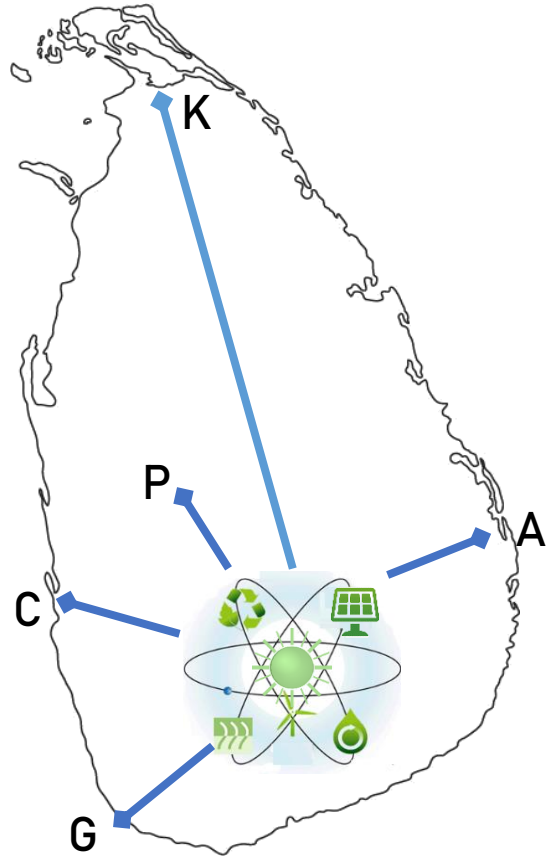
Universities contributing as a knowledge hub for national skill development in Renewable Energy sector

# THREE Lanka Outcome

## Two main Outcomes of the Three Lanka Project

(1) Five self sustainable centers for skill development in Renewable Energy sector across the country

Galle , Colombo, Peradeniya, Kilinochchi, Ampara




(2) Online Certificate courses for three levels

- Technician Level
- Engineer Level
- Project Manager Level

Explore the opportunity of developing a Stackable Master in Renewable Energy technology and management in collaboration with identified EU partners

# Methodology : Brainstorming Sessions with EU partner institutions – Identifying Short Course Titles

The study was carried out by evaluating THREE main professional categories

(1) Technicians

(2) Engineers

(3) Project Managers

- Numerous short course titles were listed out through an intensive brainstorming session with EU partner institutions (Number of short meetings per week during COVID 19 affected period)
- From 82 titles initially listed, four were eliminated due to similarities
- Evaluating 79 short courses in a single cluster seemed not optimal
- They were classified into 10 main classes

# Methodology - Classification of Short Courses

### Sustainable Energy: Design a Renewable Future

The potential of renewable energy sources like wind, solar and biomass will be assessed. Also, the fundamental ideas behind some major renewable energy technologies will be covered

### Sustainable Business In The Renewable Energy Sector

How can the renewable industry promote sustainable socio-economic development while generating profits?

### Management Of Renewable Energy Systems: Society And Technology Interactions

Management and governance regarding production should be improved through renewable energy adoption and the course describe the fundamentals of this subject.

### Sustainable Action: Solutions For A Changing Planet

This course discusses how to integrate energy sustainability to counter global dilemmas, such as climate change, and waste management

### Incorporating Renewable Energy In Electricity Grids And Other Traditional Energy Systems

How to seek high penetrations of solar/wind and other renewable energy sources while maintaining system reliability.

# Methodology - Classification of Short Courses

### Energy, Environment, And Lifecycle Analysis

This course includes the assessment techniques to analyze how much renewable potential the globe has, who uses it, and what that all means.

### Renewable Energy And Green Buildings

The course explains how finance, design, engineering, and environmental sectors could associate with “Real-State” to generate some of the most lucrative business opportunities.

### Solar Energy Systems

Solar energy is be the most popular and widely adopted renewable energy option available presently. Most of the things about solar will be covered here.

### Wind Energy Systems

Even while numerous research is ongoing to improve the whole wind energy extraction, it is still underdeveloped compared to the huge upside growth that the solar energy sector has scored. Therefore, optimizing the whole wind energy scenario is imperative for the future sustainable development of the world.

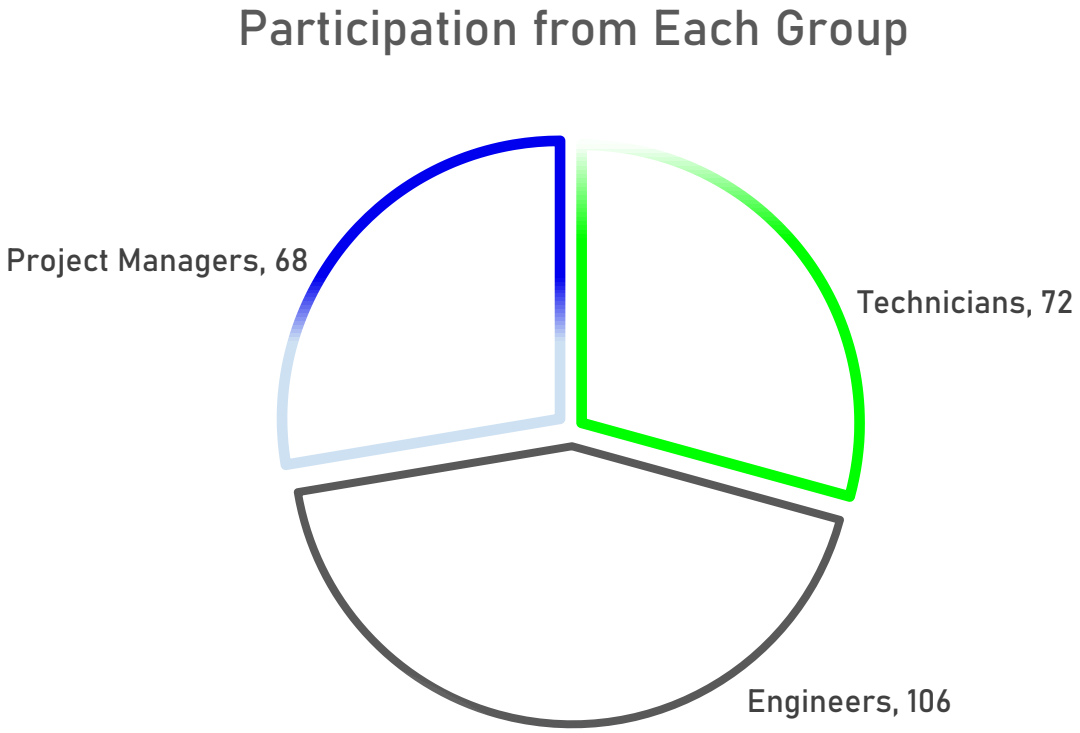
### Biomass and Other Thermal Energy Systems

The course will cover biomass and other sustainable heat energy options available in the present day.

# Methodology - Survey

THREE separate Google Forms were developed, and distributed among professionals.

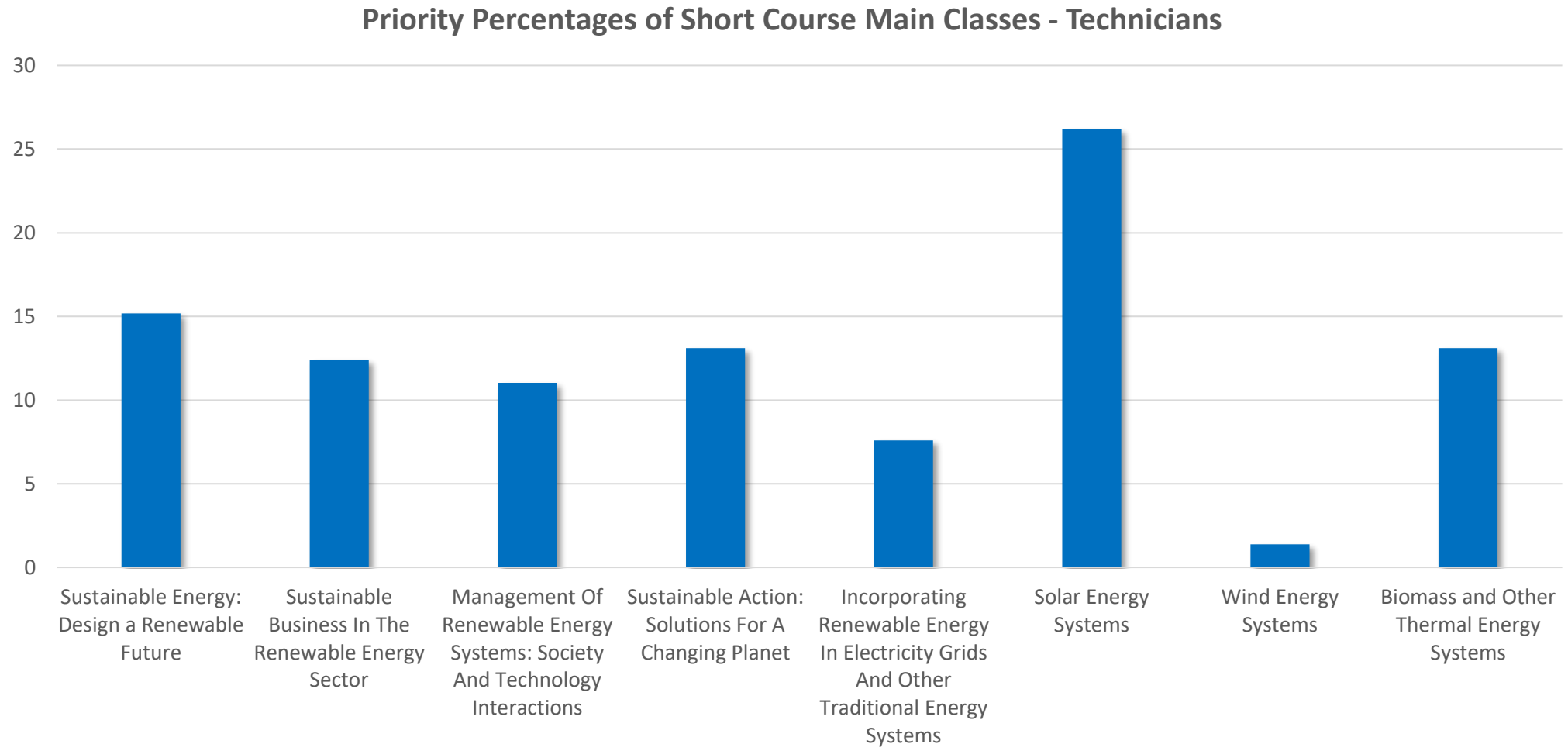
Total participants - 246



# Analysis - Main Classes Preferred by Technicians

What are the 1-5 priorities preferabilities among main classes?

The participants were asked to choose five priority main classes. There, they were allowed to exit the questionnaire if they preferred less than five main classes.



# Analysis - Selection of Short Courses by Technicians

One participant was able to choose several short courses from one main class

No. of participants = 72

## Sustainable Energy: Design a Renewable Future

| | |
|---|---|
| [Introduction to RE technologies] | 4 |
| [Introduction to RE power generation technologies] | 4 |
| [Certificate of RE harnessing and quantification techniques] | 4 |
| [Certificate of RE system design, installation and commissioning procedures] | 21 |
| [Certificate in installation of instruments and measurement technologies of solar and wind resources] | 21 |
| [Introduction to energy storage technologies] | 13 |
| [Certificate of RE system monitoring, maintenance and performance reporting] | 13 |
| [Energy efficiency improvements for RE power plants] | 21 |
| [Introduction to RE projects] | 4 |
| [Certificate of industrial safety standards in RE technologies] | 13 |
| [RE resource assessments and preliminary studies] | 0 |

## Sustainable Business In The Renewable Energy Sector

| | |
|---|---|
| [How to become an RE entrepreneur] | 17 |

## Management Of Renewable Energy Systems: Society And Technology Interactions

| | |
|---|---|
| [RE data collections and management] | 21 |

## Sustainable Action: Solutions For A Changing Planet

| | |
|---|---|
| [Introduction to Waste-to-Energy] | 13 |
| [Waste to Energy – Technologies and Perspectives] | 17 |

## Incorporating Renewable Energy In Electricity Grids And Other Traditional Energy Systems

| | |
|---|---|
| [Introduction to RE grid integration] | 13 |
| [Design, installation, operation, and maintenance of battery storage systems] | 0 |
| [Performance evaluation of Solar/Wind/Small hydro and biomass plants] | 17 |

## Solar Energy Systems

| | |
|---|---|
| [Introduction to solar resource] | 30 |
| [Installation, operation and management of PV system] | 38 |
| [Certificate in installation of rooftop solar PV systems] | 38 |
| [Solar pumping] | 8 |
| [Operation and maintenance of solar PV plants] | 38 |
| [Construction, supervision and performance verification large-scale solar PV projects] | 21 |

## Wind Energy Systems

| | |
|---|---|
| [Introduction to wind resource] | 8 |
| [Construction, Supervision and Performance Verification of Large-Scale Wind Projects] | 4 |
| [Installation, operation and maintenance of wind power plants] | 4 |

## Biomass and Other Thermal Energy Systems

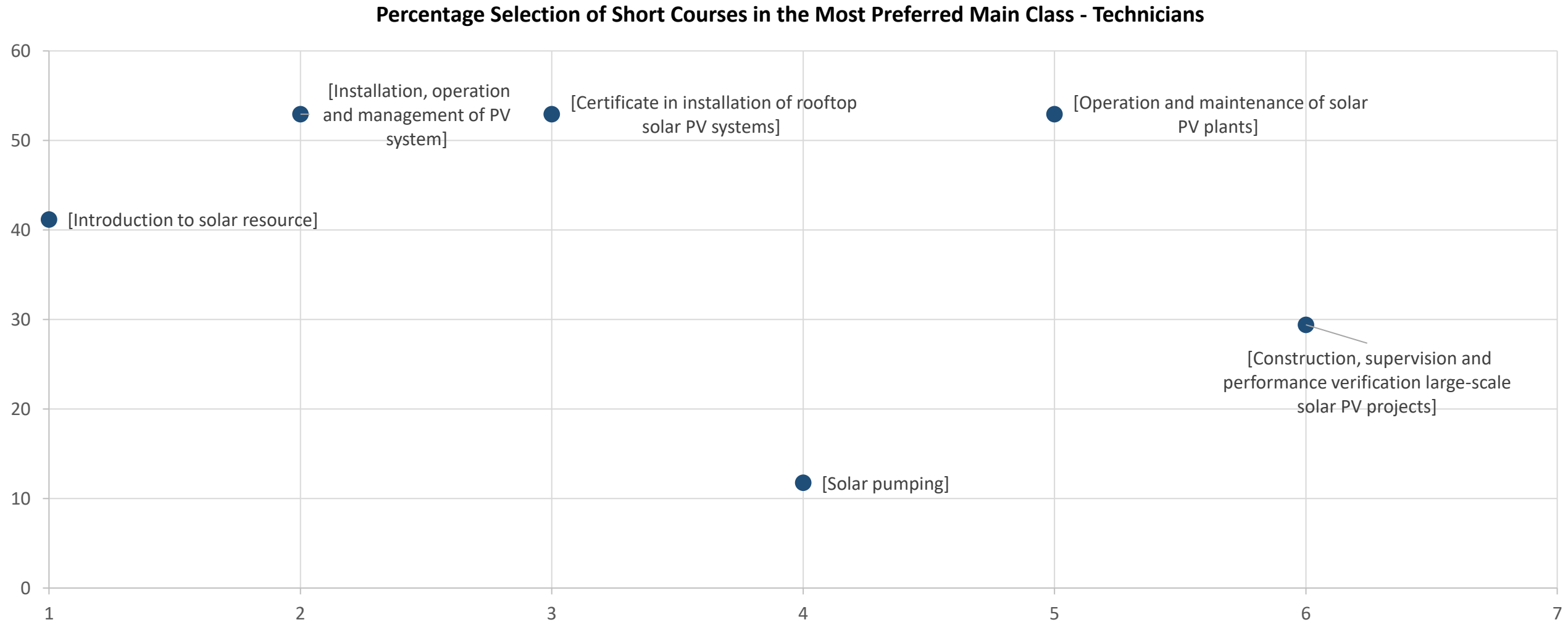
| | |
|---|---|
| [Introduction to bioenergy] | 13 |
| [Introduction to geothermal energy] | 8 |
| [Installation, operation and management of biogas/biomass heat & power plants] | 0 |
| [Installation, operation and management of geothermal energy] | 0 |
| [Project development, planning and feasibility of biogas/biomass heat & power plants] | 0 |
| [Project development, planning and feasibility of geothermal] | 0 |

# Analysis - Most Preferred Main Class Among Technicians

According to the results, the most preferred main class among technicians is,

No. of participants = 72

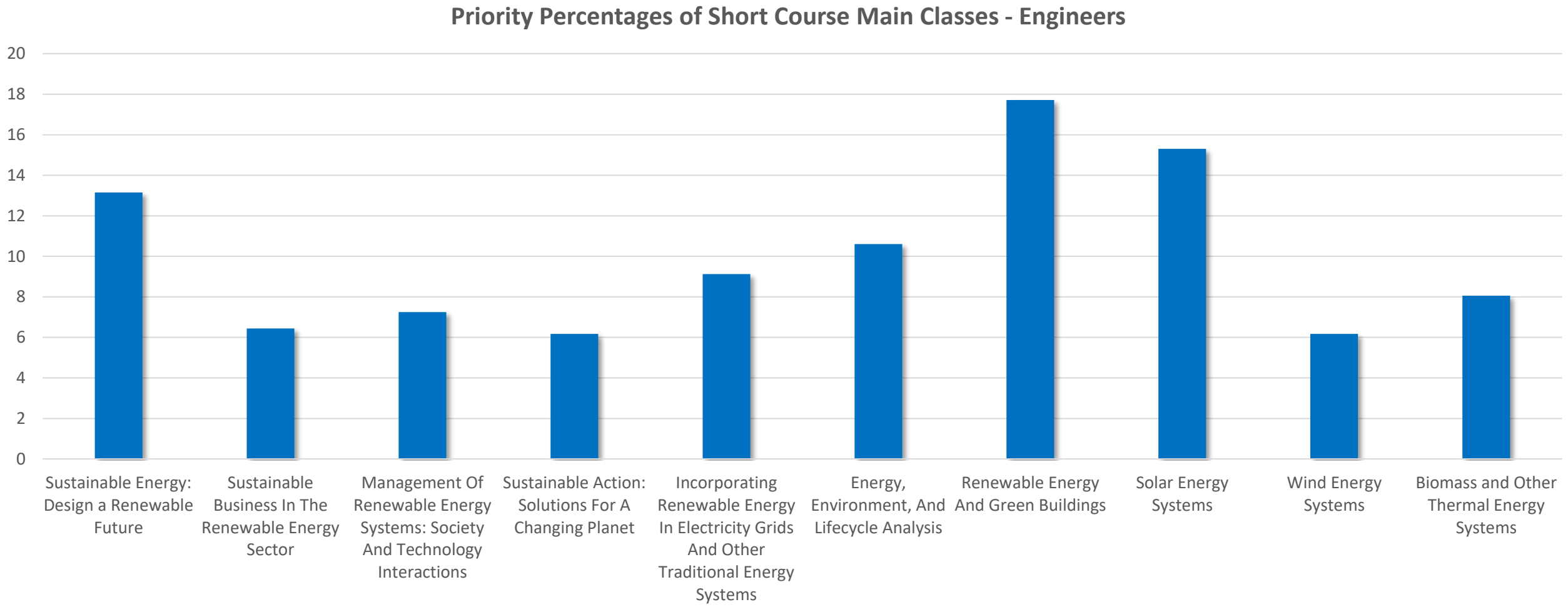
Solar Energy Systems



# Analysis - Main Classes Preferred by Engineers

What are the 1-5 priorities preferabilities among main classes?

The participants were asked to choose five priority main classes. There, they were allowed to exit the questionnaire if they preferred less than five main classes.



# Analysis - Selection of Short Courses by Engineers

One participant was able to choose several short courses from one main class

No. of participants = 106

## Sustainable Energy: Design a Renewable Future

| | |
|---|---|
| [Introduction to RE technologies] | 22 |
| [Introduction to RE power generation technologies] | 26 |
| [Certificate of RE harnessing and quantification techniques] | 26 |
| [Certificate of RE system design, installation and commissioning procedures] | 25 |
| [Certificate in installation of instruments and measurement technologies of solar and wind resources] | 28 |
| [Introduction to energy storage technologies] | 26 |
| [Certificate of RE system monitoring, maintenance and performance reporting] | 29 |
| [Energy efficiency improvements for RE power plants] | 33 |
| [Introduction to RE projects] | 23 |
| [Certificate of industrial safety standards in RE technologies] | 25 |

## Sustainable Business In The Renewable Energy Sector

| | |
|---|---|
| [Investigating sustainable energy (SE) options in enterprises] | 10 |
| [How to become an RE entrepreneur] | 17 |
| [Understanding customer requirements and maximizing service offering] | 14 |
| [RE market development] | 8 |
| [RE business development] | 12 |
| [RE project managing & financing] | 10 |
| [Finance for nonfinance managers] | 11 |
| [Funding mechanisms for RE projects and businesses] | 10 |

## Management Of Renewable Energy Systems: Society And Technology Interactions

| | |
|---|---|
| [Conducting a RE project technical and financial feasibility study] | 17 |
| [Conducting a RE project environmental feasibility study] | 19 |
| [Environmental and social impact assessment and monitoring of RE projects] | 19 |
| [RE project initiation and management] | 17 |
| [Project management for Wind/Solar projects developments] | 18 |
| [Project development, planning and feasibility of Hybrid RE systems] | 14 |
| [Regulations and standards applicable for RE project implementation] | 14 |

## Sustainable Action: Solutions For A Changing Planet

| | |
|---|---|
| [Introduction to circular economy] | 10 |
| [Impact of RE projects on reducing carbon footprint of enterprises] | 11 |
| [Introduction to Waste-to-Energy] | 12 |
| [Waste to Energy – Technologies and Perspectives] | 14 |
| [Legal aspects of RE projects] | 8 |
| [Macro and microeconomic impact of RE technologies and aligning with national objectives] | 8 |

## Incorporating Renewable Energy In Electricity Grids And Other Traditional Energy Systems

| | |
|---|---|
| [Introduction to RE grid integration] | 23 |
| [Designing of balance of plant systems of RE projects] | 23 |
| [Battery energy storage systems for RE applications] | 22 |
| [Design, installation, operation, and maintenance of battery storage systems] | 23 |
| [Designing & optimizing hybrid RE systems] | 26 |
| [Integration of RE technologies in national generation plan] | 22 |
| [How to conduct the feasibility study for Solar/Wind with energy storage systems] | 22 |
| [Performance evaluation of Solar/Wind/Small hydro and biomass plants] | 26 |
| [Project development, planning and feasibility of PV systems – On-grid] | 22 |
| [Project development, planning and feasibility of PV systems – Off-grid] | 18 |

# Analysis - Selection of Short Courses by Engineers

One participant was able to choose several short courses from one main class

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## Energy, Environment, And Lifecycle Analysis

| | |
|---|---|
| [Impact of RE projects (both electricity and thermal - fuelwood replacing oil) on energy costs of enterprises] | 21 |
| [Carbon footprint calculation of RE projects] | 28 |
| [EIA (Environmental Impact Assessment) for RE projects] | 21 |
| [AIA (American Institute of Architects) Energy Modelling for RE projects] | 19 |
| [Wind and Solar resource forecasting] | 17 |
| [How to conduct the ESIA (Environmental and Social Impact Assessment) for Solar/Wind power project] | 18 |

## Renewable Energy And Green Buildings

| | |
|---|---|
| [Energy zero buildings with RE projects] | 44 |
| [Integrating RE into green buildings] | 48 |

## Solar Energy Systems

| | |
|---|---|
| [Introduction to solar resource] | 30 |
| [Installation, operation and management of PV system] | 37 |
| [Certificate in installation of rooftop solar PV systems] | 32 |
| [Designing of solar PV power plants] | 33 |
| [Solar pumping] | 30 |
| [Operation and maintenance of solar PV plants] | 36 |
| [Solar resource assessment for development of commercial-scale solar PV projects] | 34 |
| [Construction, supervision and performance verification large-scale solar PV projects] | 33 |
| [Standards and code of practices for installation of solar systems] | 30 |
| [Preparation of bid documents and procurement of solar PV projects] | 30 |

## Wind Energy Systems

| | |
|---|---|
| [Introduction to wind resource] | 18 |
| [Designing of wind power plants] | 22 |
| [Construction, Supervision and Performance Verification of Large-Scale Wind Projects] | 19 |
| [Installation, operation and maintenance of wind power plants] | 19 |
| [Wind resource assessment for development of commercial-scale wind power projects] | 19 |
| [Project development, planning and feasibility of wind plant – Onshore] | 18 |
| [Project development, planning and feasibility of wind plant – Offshore] | 15 |
| [Preparation of bid documents and procurement of wind projects] | 19 |

## Biomass and Other Thermal Energy Systems

| | |
|---|---|
| [Introduction to bioenergy] | 19 |
| [Introduction to geothermal energy] | 18 |
| [Installation, operation and management of biogas/biomass heat & power plants] | 29 |
| [Installation, operation and management of geothermal energy] | 19 |
| [Project development, planning and feasibility of biogas/biomass heat & power plants] | 29 |
| [Project development, planning and feasibility of geothermal] | 18 |

# Analysis - Most Preferred Main Class Among Engineers

According to the results, the most preferred main class among technicians is,

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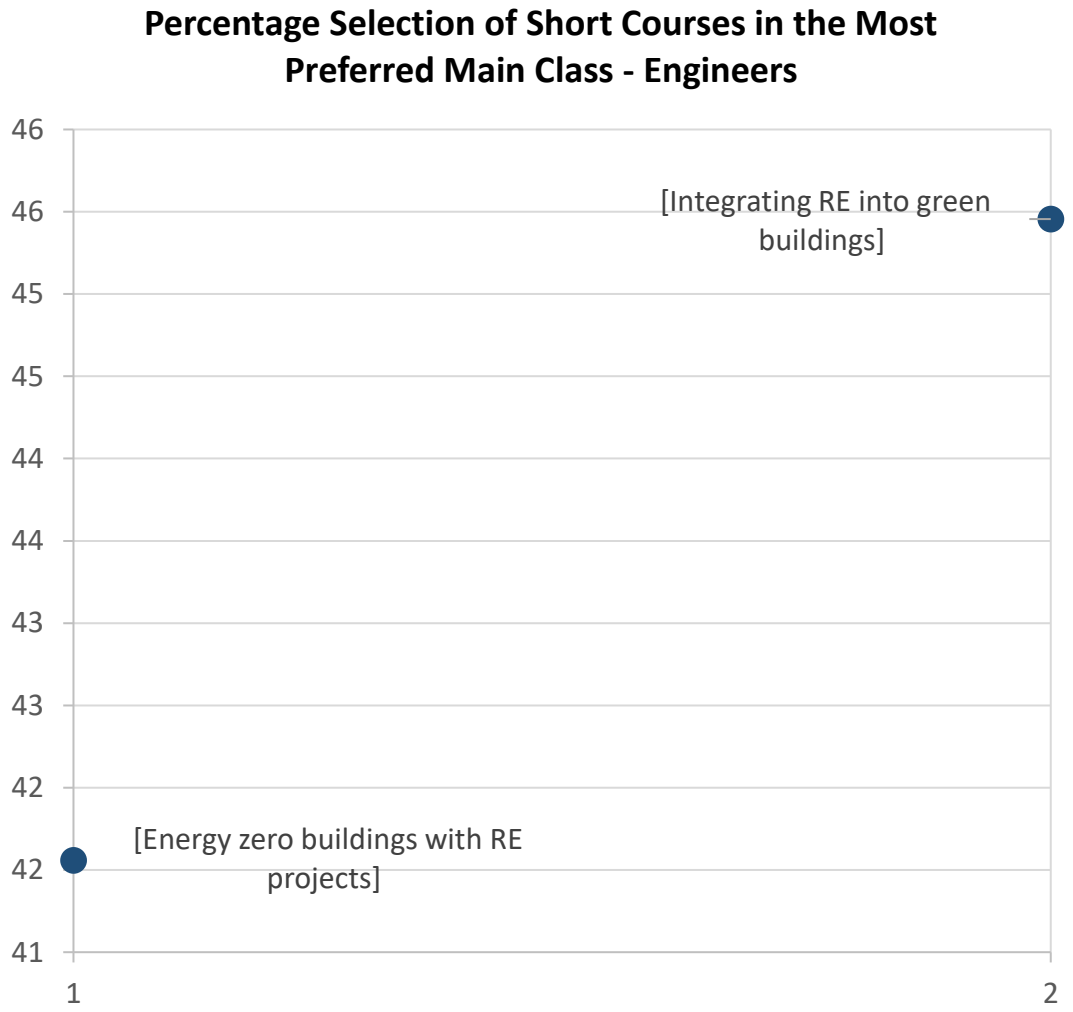
Renewable Energy And Green Buildings



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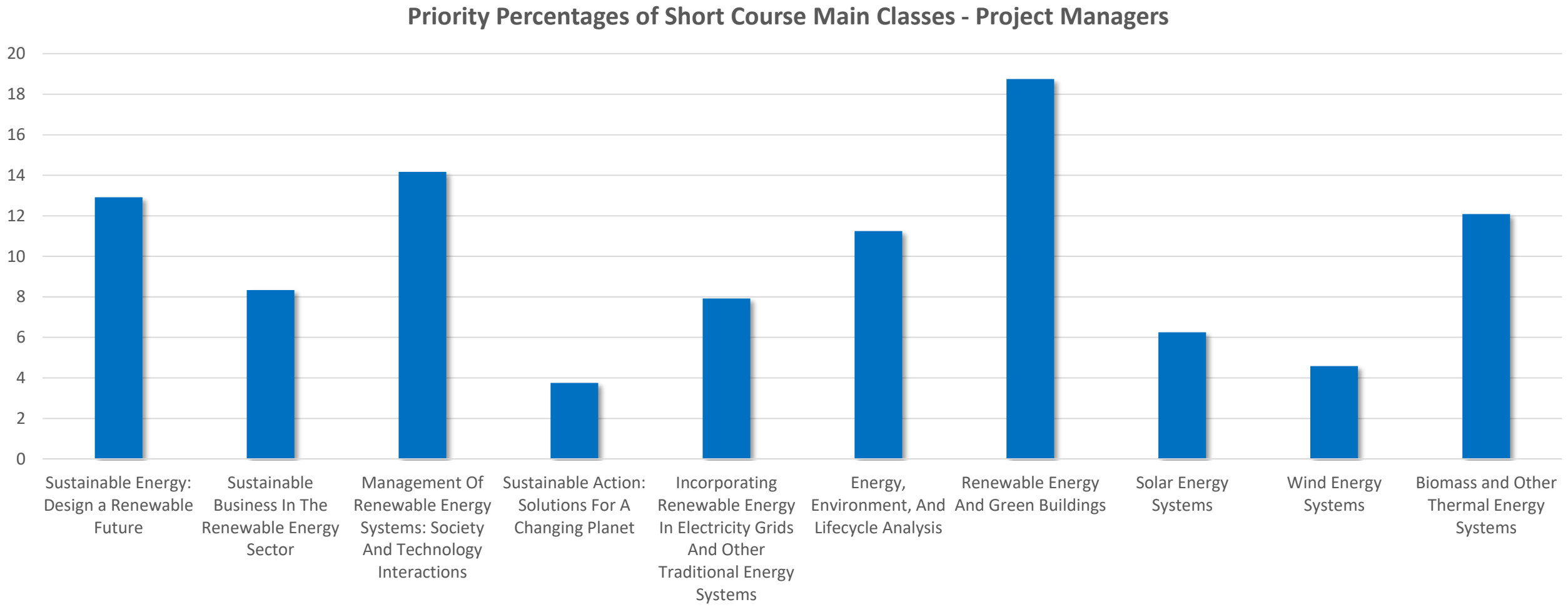

# Analysis - Selection of Short Courses by Project Managers

One participant was able to choose several short courses from one main class

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**Sustainable Energy: Design a Renewable Future**

| | |
|---|---|
| [Introduction to RE technologies] | 16 |
| [Introduction to RE power generation technologies] | 19 |
| [Certificate of RE harnessing and quantification techniques] | 11 |
| [Introduction to energy storage technologies] | 16 |
| [Introduction to RE projects] | 22 |
| [Certificate of industrial safety standards in RE technologies] | 16 |

**Sustainable Business In The Renewable Energy Sector**

| | |
|---|---|
| [How to become an RE entrepreneur] | 3 |
| [RE market development] | 11 |
| [RE business development] | 5 |
| [RE project managing & financing] | 14 |
| [Finance for nonfinance managers] | 8 |
| [Funding mechanisms for RE projects and businesses] | 14 |

**Management Of Renewable Energy Systems: Society And Technology Interactions**

| | |
|---|---|
| [Conducting a RE project technical and financial feasibility study] | 22 |
| [RE project initiation and management] | 22 |
| [Financing of RE projects] | 22 |
| [Project management for Wind/Solar projects developments] | 22 |
| [Regulations and standards applicable for RE project implementation] | 22 |
| [Financial appraisal of RE Projects] | 22 |

**Sustainable Action: Solutions For A Changing Planet**

| | |
|---|---|
| [Introduction to Waste-to-Energy] | 14 |
| [Waste to Energy – Technologies and Perspectives] | 8 |
| [Legal aspects of RE projects] | 8 |
| [Macro and microeconomic impact of RE technologies and aligning with national objectives] | 14 |

**Incorporating Renewable Energy In Electricity Grids And Other Traditional Energy Systems**

| | |
|---|---|
| [Introduction to RE grid integration] | 16 |
| [Integration of RE technologies in national generation plan] | 11 |
| [How to conduct the feasibility study for Solar/Wind with energy storage systems] | 16 |
| [Performance evaluation of Solar/Wind/Small hydro and biomass plants] | 16 |

**Energy, Environment, And Lifecycle Analysis**

| | |
|---|---|
| [How to conduct the ESIA (Environmental and Social Impact Assessment) for Solar/Wind power project] | 27 |

**Renewable Energy And Green Buildings**

| | |
|---|---|
| [Integrating RE into green buildings] | 33 |

**Solar Energy Systems**

| | |
|---|---|
| [Introduction to solar resource] | 22 |

**Wind Energy Systems**

| | |
|---|---|
| [Introduction to wind resource] | 14 |
| [Preparation of bid documents and procurement of wind projects] | 14 |

**Biomass and Other Thermal Energy Systems**

| | |
|---|---|
| [Introduction to bioenergy] | 22 |
| [Introduction to geothermal energy] | 14 |

Project managers have also voted "**Renewable Energy And Green Buildings**" as the most preferable main class.

# Analysis - Selection of Short Courses and secondary feedback from the industry

| Track one – Technicians Certificates |
|---|
| T1: Renewable energy system installation and commissioning procedures |
| T2: Industrial safety standards for renewable energy technologies |
| T3: Installation of Photovoltaic systems |
| T4: Operation and maintenance of solar Photovoltaic plants |
| T5: Solar thermal/pumping systems |
| T6: Installation, operation and maintenance of energy storage systems |
| T7: Installation of rooftop solar Photovoltaic systems |
| T8: Installation, operation and management of biogas/biomass heat & power plants |
| T9: Wind turbine, installation, commissioning, monitoring and maintenance procedure |
| T10: Small hydro power plant, installation, commissioning, and maintenance procedure |

| Track two – Engineers Certificates |
|---|
| E1: How to become an renewable energy entrepreneur |
| E2: Renewable energy system design, installation and commissioning procedures |
| E3: Design of hybrid renewable energy systems |
| E4: Renewable energy and green buildings |
| E5: Planning of operation and maintenance of photovoltaic systems |
| E6: Design, installation and maintenance of energy storage technologies |

| Track three – Project Managers Certificates |
|---|
| P1: Renewable Energy policies |
| P2: Evaluation of performances of renewable energy systems |
| P3: Environmental impact assessment of renewable energy projects - general |
| P4: Conducting a renewable energy project technical and financial feasibility study (Photovoltaic /wind power plant) |

Secondary Feedback from the Industrial Association in Sri Lanka and Sri Lanka Energy Managers Association

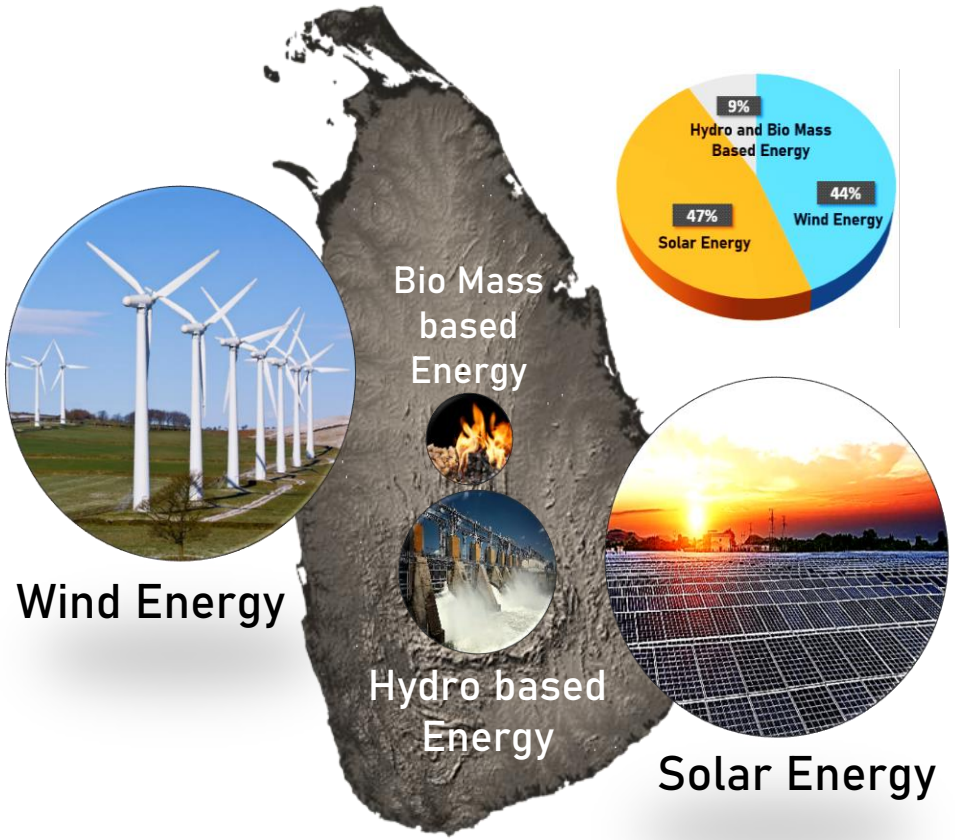
Finalisation of the Content and Development of the courses

First Implementation (1st week of April)

# How the project supports to Growth and Jobs

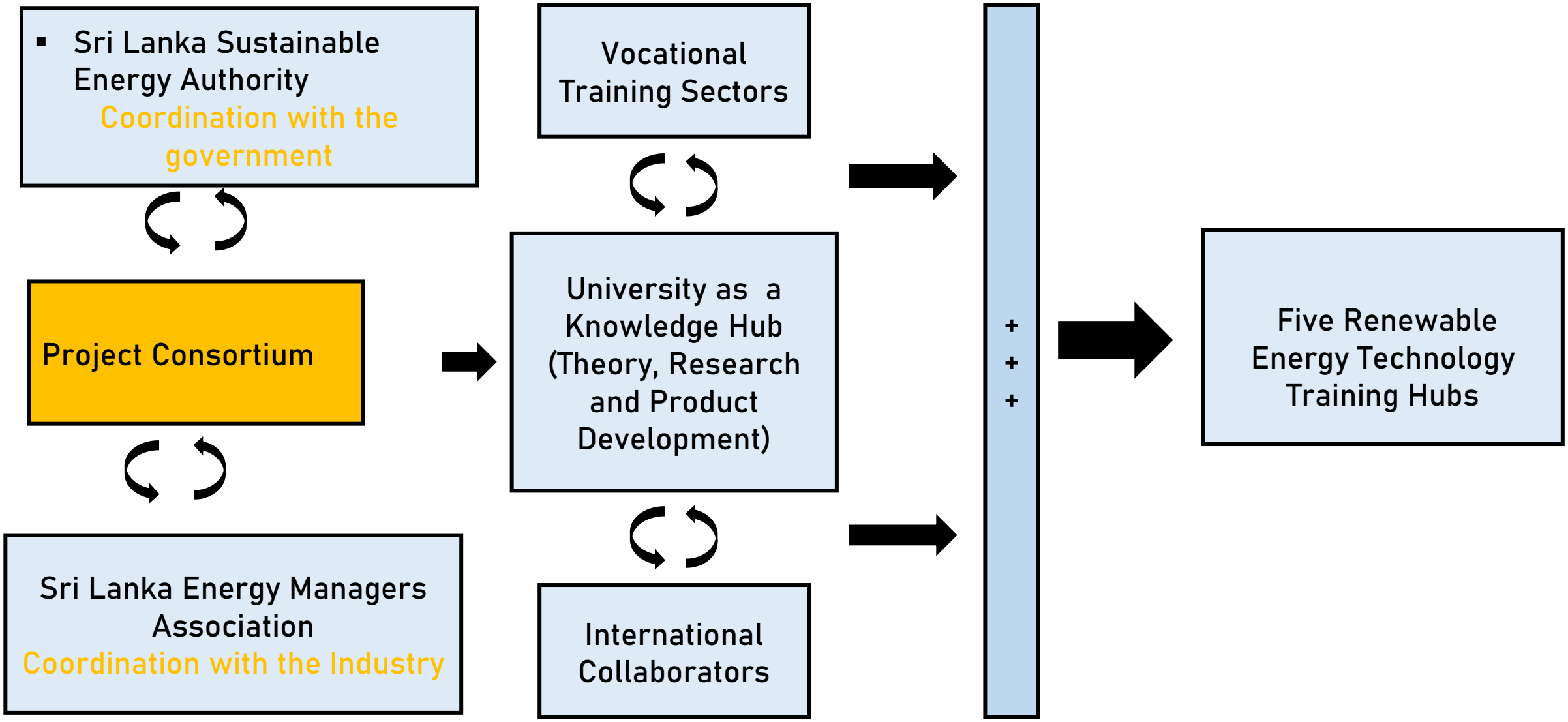
## THREE LANKA project is in line with future government energy policy

- The government of Sri Lanka has provided policy direction to produce 70% energy demand from renewable energy sources in year 2030. Thus, the intended outcome of this project for addressing the existing skill gap in the area of RE technologies is a timely requirement of the country
- The report, titled "Assessment of Sri Lanka's Power Sector : 100 % Electricity Generation through Renewable Energy by 2050", indicates that by 2050, the country's installed electricity generation capacity demand will increase from the current 3,700 megawatts (MW) to about 34,000 MW
- According to a joint study conducted by the UN Development Programme (UNDP) and Asian Development Bank (ADB), Sri Lanka can meet its entire current and future electricity demand by judicial use of RE by 2050




Expected RE based power generation distribution by 2050

# Implement as Collaborative Technology Hub



# Challenges and Mitigation Strategies for the Sustainability

| Challenge | Mitigation Strategy |
|---|---|
| To recognise the programme by the industry | Continues coordination with the Industry sector through industrial associations<br>Ex: Solar Energy Association<br>Sri Lanka Energy Managers Association |
| To get the continues feedback from the industry for the continues improvement | Sri Lanka Energy Managers association as the project partner is undertaking this responsibility |
| To get the Sri Lankan government support for developing RE supported polices and employment opportunities | Sri Lanka Sustainable Energy Authority is contributing as a project partner |
| Future improvements of the course content and include novel RE technologies | EU partner institutions and five universities has already developed research collaborations and intended to share knowhow in future |
| To satisfy vocational training standards in Sri Lanka | Sri Lanka Vocational training institute is act as advisor |
| Transfer opportunities to most rural locations in Sri Lanka | Five universities based RE hub are located in five provinces in Sri Lanka |

# EU Erasmus+

# THREE Lanka Project

(Training Hub for REnewable Energy Technologies in Sri Lanka)

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THREE Lanka
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# THANK YOU