EPSILON INNOVATION GROUP

AMERICAN MADE SOLAR PRIZE

U.S. DEPARTMENT OF ENERGY

Resilience Data Analytics

Energy Workforce Planning Tool

Preparing Solar Energy Workforce Solutions for the 21st Century

American-Made Solar Prize

Software Track

SUBMISSION FOR READY!

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October 5, 2021

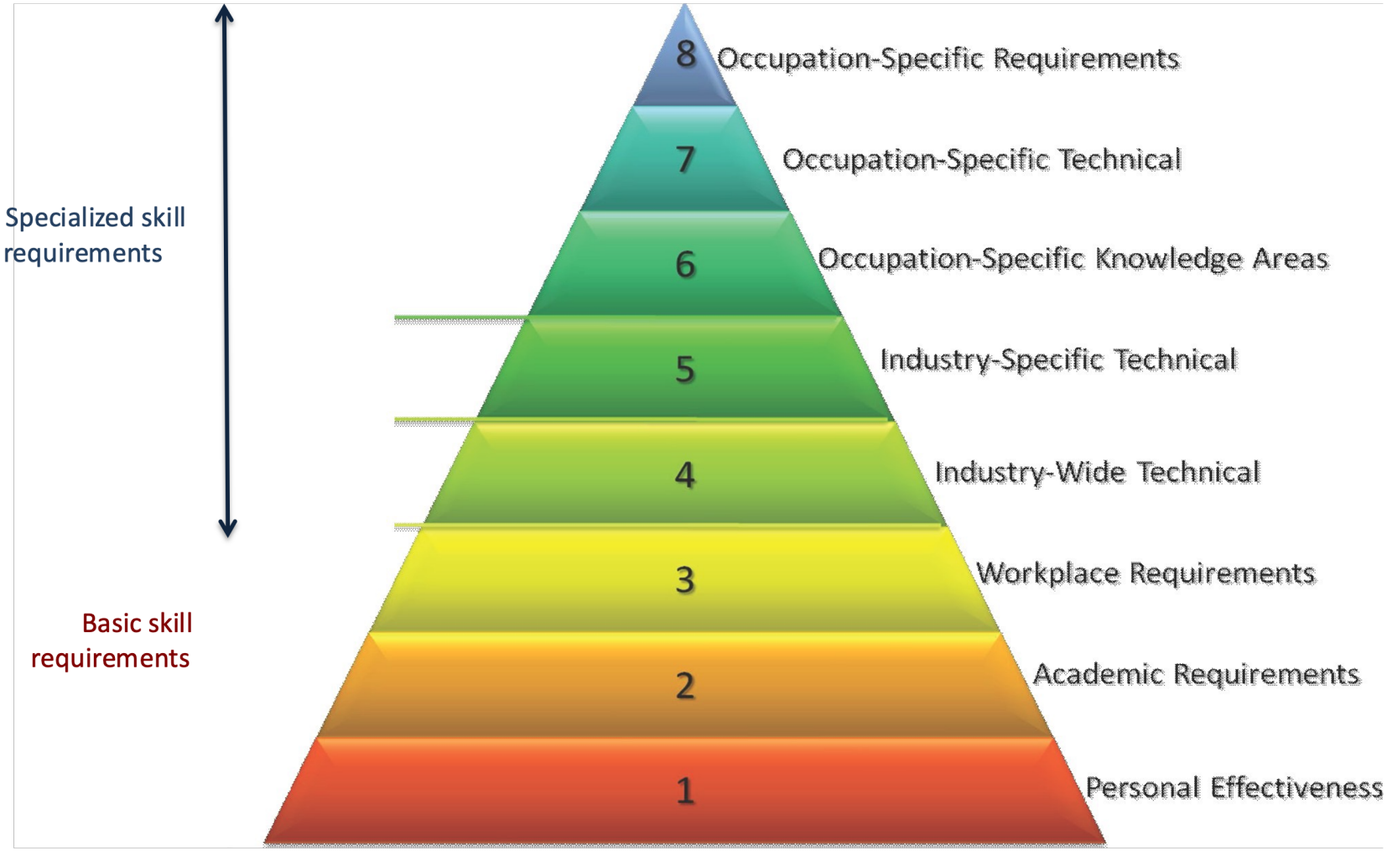
Problem Statement

- *Demand to fill energy sector occupations is often face with a* ***shortage of adequate skills***
- Government, industry and educational institutions are not ready to prepare competent energy workforce to meet the demand.
- A robust and an easy to tool for preparing energy workforce is not readily available.
- Thus, there is a need for Solar Energy Workforce Data Analytics Tool to help plan in preparing enough skills energy workforce, which is the objective of this submission.

Solution

- In order to mitigate the challenge, Epsilon Innovation Group has developed an excel based Energy Workforce Planning Tool.
- In this challenge, we are proposing to scale it up and for a wider use.
- The tool has the capability to
  - Identify energy skills gaps
  - Quantify energy skills needs
  - Quantify competence requirements by educational disciplines and levels,
  - Determine training needs
  - Incorporates none-energy skills which are often overlooked such as procurement professions, market, law, business etc., and
  - Develop customized energy skills profile at local and national level.

Solution – *Methodology*



The Energy Workforce Planning Tool applies a standardized Staffing extends its analytics capability by incorporating the Energy Workforce Competence Model

Solution – *Methodology*

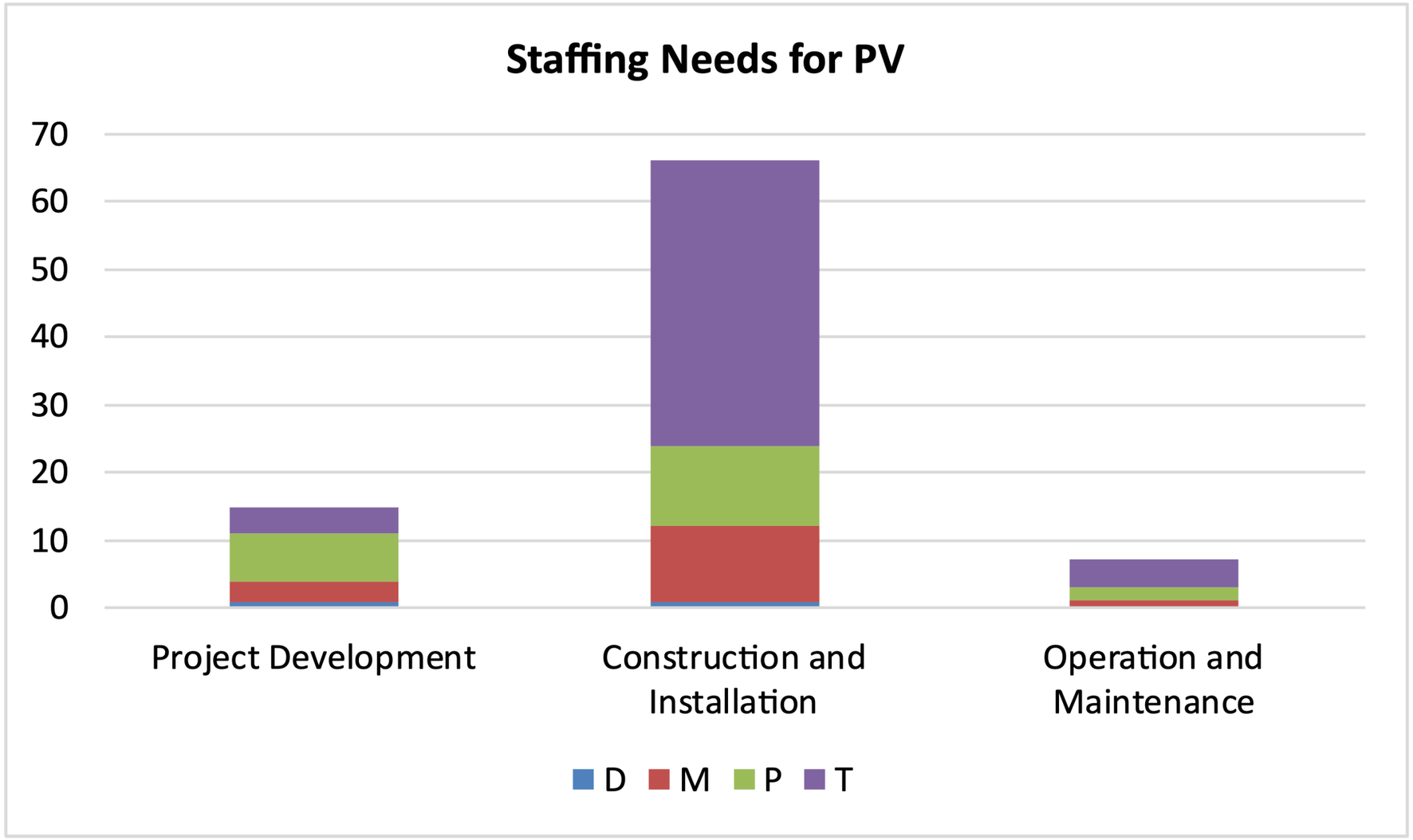
The tool shall include all workforce requirements needed in the solar energy sector including:

- Photovoltaic (PV) project value chain
- Concentrated Solar Power (CSP) project value chain
- Charging Stations
- Solar Energy Management
- Microgrids
- Grid Services
- Etc.

Accomplishments and Team

- Our team has been working to develop pilot Climate Resilience Data Analytics Tool and Clean Energy Data Analytics Tools.
- Some of the energy related pilot data analytics tools that we have developed include:
  - Energy workforce planning tool
  - Renewable energy road map evaluation tool,
  - Levelized cost analysis tool
  - Levelized cost of electricity of battery storage,
  - Socio-economic benefits analysis tool
  - Innovative energy technology evaluation tool.
- We are prepared to realize our pilot tools one at a time starting with Energy Workforce Planning Tool for solar energy value chain.

Accomplishments – *Pilot tool sample results*



PV Staffing Needs by qualifications, discipline, educational level, experience and number of skilled manpower needed for PD, C&I and O&M

Accomplishments – *Pilot tool sample results*

Qualification	Education	Experience	PV		
		yrs	PD	C&I	O&M
Plant managers	M	7			1
Project managers	M	10	1	1	
Project, System designer (electrical/mechanical/structural engineers)	P	5	1	2	
Project, System draftman (electrical/mechanical/structural engineers)	T	5	1	4	
Procurement professionals	P	5	2		
Procurement professionals - Technician	T	3	2		
Atmospheric scientists and meteorologists	D	5	1		
Sustainability specialists (natural resource/environmental planners, social scientists, cultural consultants)	M	5	1		
Environmental and social NGO representatives	P	3	1	1	
Environmental and social NGO representatives - Technician	T	3	1	1	
Environmental scientists or engineers	P	7	1	1	
Surveyors	P	5		1	
Land development advisor	P	5	1		
Electrical Engineer	M	7	1	10	1
Electrical Engineer - Technician	T	5		14	1
Commissioning engineer (electrical)	D	10		1	
Energy Efficiency Engineer	M	5			0.2
Measurement and control engineers	P	5		1	1
Mecahnical Engineer	P	7	1	4	1
Mecahnical Engineer -Technician	T	5		8	1
Software engineers	M	7			
Safety Engineer	P	5		2	
General electricians, plumbers, installers -Technician	T	3		15	1
Operations and maintenance technicians	T	3			1

Total	15	66	8.2

PV Staffing Needs by qualifications, discipline, educational level, experience and number of skilled manpower needed for PD, C&I and O&M

Accomplishments – *Pilot tool sample results*

Our tool could quantify energy skills needs by Plant Type (PV in this case), Specialty and Year

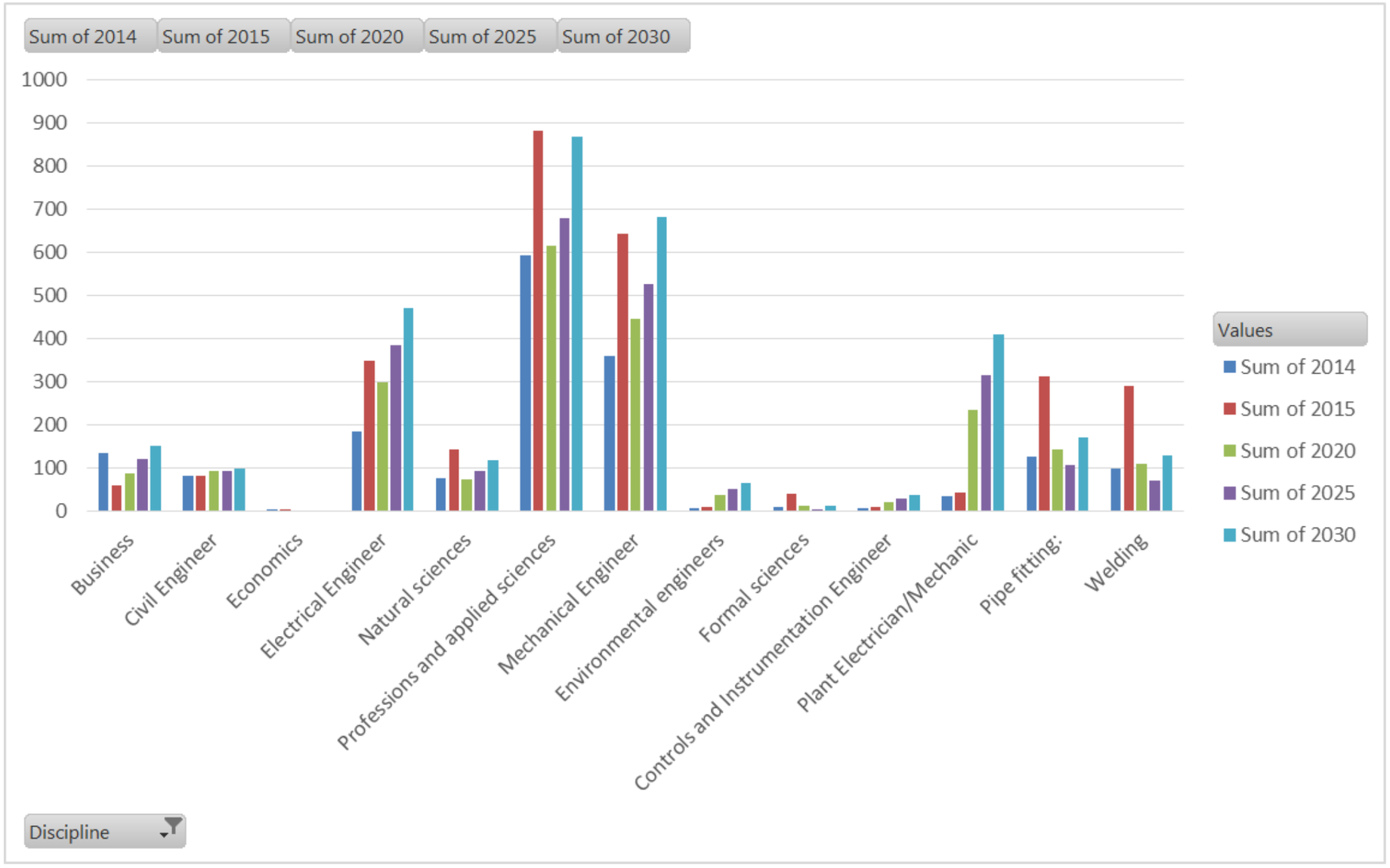
HYDRO

Row Labels	Values Sum of 2014	Sum of 2015	Sum of 2016	Sum of 2017	Sum of 2018	Sum of 2019	Sum of 2020
D	5	4	5	5	6	5	6
Electrical Engineer	3	2	3	3	3	3	4
Natural sciences	2	2	2	2	3	2	2
M	55	56	63	67	72	75	79
Business	6	8	8	9	9	11	11
Civil Engineer	14	14	16	17	18	19	20
Civil Engineer	14	14	16	17	18	19	20
Electrical Engineer	14	14	16	17	18	19	20
Natural sciences	2	2	2	2	3	2	2
Professions and applied sciences	10	8	10	10	12	10	11
Environmental engineers	6	8	8	9	9	11	11
Formal sciences	3	2	3	3	3	3	4
P	79	64	78	82	93	84	93
Business	2	2	2	2	3	2	2
Civil Engineer	20	15	18	20	22	20	21
Civil Engineer	0	0	0	0	0	0	0
Surveyors	20	15	18	20	22	20	21
Economics	2	2	2	2	3	2	2
Natural sciences	0	0	0	0	0	0	0
Professions and applied sciences	20	16	20	20	24	20	24
Mechanical Engineer	35	29	36	38	41	40	44
Controls and Instrumentation Engineer	0	0	0	0	0	0	0
T	260	198	266	273	281	287	340
Business	2	2	2	2	3	2	2
Civil Engineer	25	16	25	25	25	25	31
Civil Engineer - Technician	14	9	14	14	14	14	17
Construction equipment operator -Technician	11	7	11	11	11	11	14
Electrical Engineer	15	14	16	17	17	19	21
Natural sciences	0	0	0	0	0	0	0
Professions and applied sciences	103	75	105	107	110	111	134
Mechanical Engineer	28	24	27	29	31	31	34
Plant Electrician/Mechanic	17	22	23	25	27	31	33
Pipe fitting:	42	27	41	41	41	41	51
Welding	28	18	27	27	27	27	34
	0	0	0	0	0	0	0
Grand Total	**399**	**322**	**412**	**427**	**452**	**451**	**518**

Geothermal

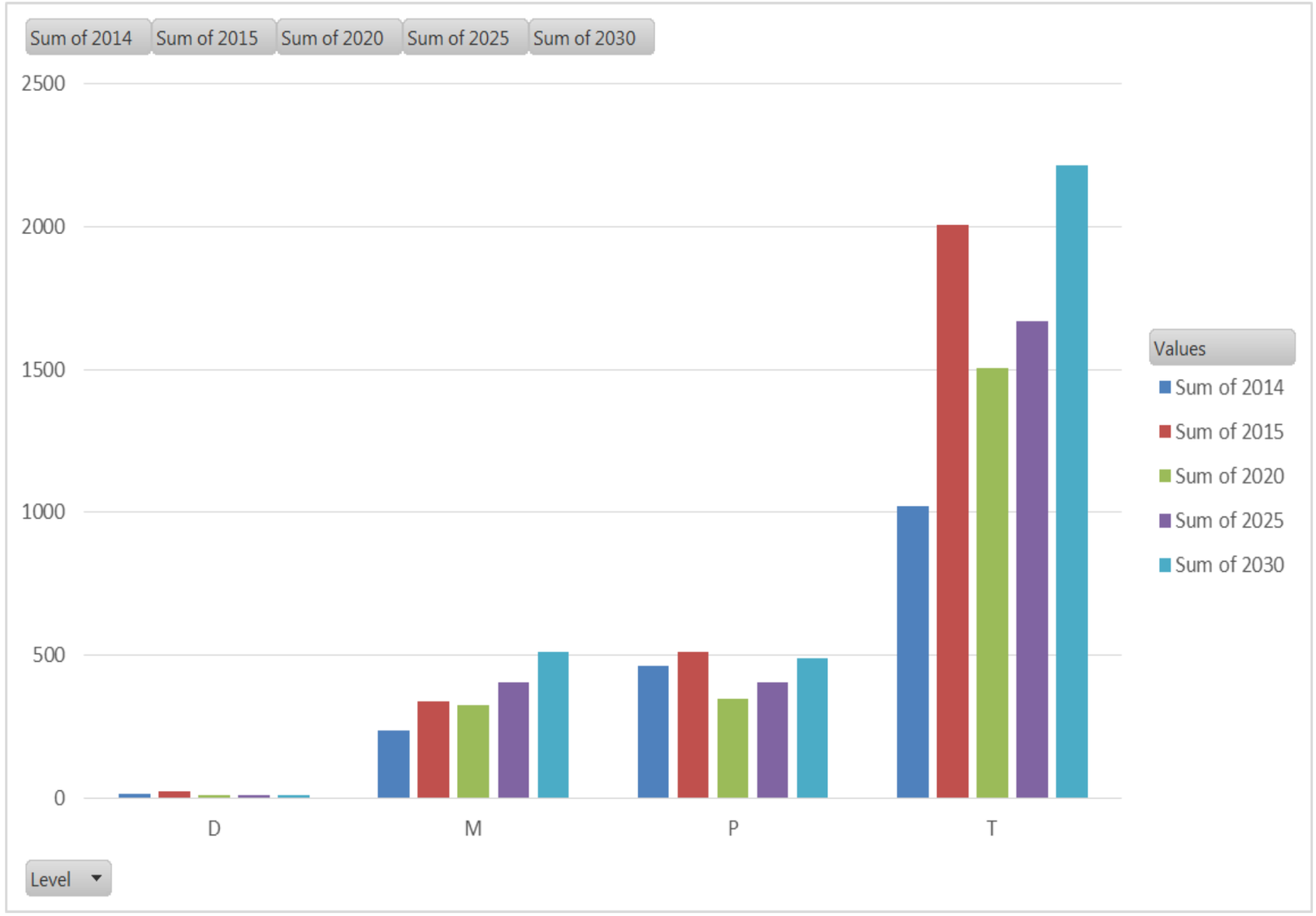
Row Labels	Values Sum of 2014	Sum of 2015	Sum of 2016	Sum of 2017	Sum of 2018	Sum of 2019	Sum of 2020
D	0	0	0	0	0	0	0
Electrical Engineer	0	0	0	0	0	0	0
Natural sciences	0	0	0	0	0	0	0
M	21	20	23	25	21	21	23
Business	0	0	1	1	2	2	2
Civil Engineer	3	3	3	3	2	2	2
Civil Engineer	3	3	3	3	2	2	2
Electrical Engineer	4	5	6	7	6	6	7
Natural sciences	7	7	7	8	5	5	6
Professions and applied sciences	7	5	5	5	4	4	4
Environmental engineers	0	0	1	1	2	2	2
Formal sciences	0	0	0	0	0	0	0
P	47	45	47	50	39	39	42
Business	2	1	1	1	1	1	1
Civil Engineer	7	9	9	10	7	7	8
Civil Engineer	4	4	4	4	4	4	4
Surveyors	3	5	5	6	3	3	4
Economics	0	0	0	0	0	0	0
Natural sciences	13	8	8	8	7	7	7
Professions and applied sciences	12	12	12	12	8	8	8
Mechanical Engineer	13	15	16	18	14	14	16
Controls and Instrumentation Engineer	0	0	1	1	2	2	2
T	75	115	122	134	99	99	117
Business	2	1	1	1	1	1	1
Civil Engineer	6	8	9	10	7	7	8
Civil Engineer - Technician	3	5	5	6	3	3	4
Construction equipment operator -Technician	3	3	4	4	4	4	4
Electrical Engineer	5	13	13	15	8	8	10
Natural sciences	19	12	12	13	13	13	14
Professions and applied sciences	22	49	50	55	32	32	38
Mechanical Engineer	18	23	24	27	20	20	24
Plant Electrician/Mechanic	0	0	1	1	3	3	4
Pipe fitting:	2	6	8	8	10	10	12
Welding	1	3	4	4	5	5	6
	0	0	0	0	0	0	0
Grand Total	**143**	**180**	**192**	**209**	**159**	**159**	**182**

Accomplishments – *Pilot tool sample results*



Energy Workforce Requirements Analysis – BY DISCIPLINE

Accomplishments – *Pilot tool sample results*



Energy Workforce Requirements Analysis – BY EDUCATION

Team

- As the principal investigator, **Dr. Gilau** has has made data analytics related presentations, developed pilot tools indicated in the previous slides, authored book chapters at international level, and study reports.
- Some of the examples include:
  - GEA, 2012: *Global Energy Assessment* (International Institute for Applied Systems Analysis, Luxemburg, Austria)
  - World Bank, 2013. *Low-carbon development: opportunities for Nigeria* (Chapter 6: The Power Sector).
- **Mr. John Rogers**, an affiliate with Epsilon Innovation Group has been also involved in developing the energy workforce pilot tool.
- However, the core tool development shall be conducted by a **software developer** who needs to be hired.

Plan

- At the **Ready! Contest stage,** we shall develop a software using one states or county climate action plan or solar energy deployment plan through 2035 and 2050.
- To develop the Energy Workforce Planning Tool, we shall hire a **software engineer**
- At this stage, we shall be able to accomplish the task within the given budget with technical support from American Made Challenge
- There is no perceived risk of data shortage

Thank You

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