



December 14, 2012
US Citizenship & Immigration Services
California Service Center
P.O Box 10129
Laguna Niguel, CA 92607-0129

RE: EB-1 Petition for Pramod Krishnani

This letter is written in support of the non-immigrant EB-1 visa petition for Pramod Krishnani based on his classification as an individual of extraordinary ability in advancing science and technologies, especially in the area of renewable energy.

My name is Michael DeAngelis, Manager of the Energy Research and Development Department at the Sacramento Municipal Utility District (SMUD). I led and managed many programs for the research, development and commercialization of innovative renewable energy, energy efficiency and distributed generation technologies for the past 30 years. Prior to working at SMUD, I was the Deputy Chief of the Technology Systems Division of the California Energy Commission where I conducted many new successful major alternative energy research and commercialization programs. I formerly worked at the National Renewable Energy Laboratory (NREL) in Colorado, at British Columbia Hydropower Authority, and worked as lecturer on alternative energy at California State University in Sacramento, California. I gave hundreds of presentations on the subject of alternative energy and I published more than 30 reports or papers. I have a Bachelor of Science and a Masters of Science degrees in environmental science and environmental planning (California State University, Sacramento and the University of British Columbia in Vancouver, Canada).

I have known Mr. Krishnani since 2008, when he was hired at Sacramento Municipal Utility District's Advanced Renewable and Distributed Generation technology Program as a student intern. SMUD has been a leader in renewable energy generation like solar power, wind power and biomass for more than 25 years. It is one of the ten largest publicly owned utilities in the United States, generating the bulk of its power through natural gas (estimated 56% of production total in 2009) and large hydroelectric generation plants (22% in 2009), and SMUD's green power (renewable) energy output was estimated as 19% in 2009. In order to support the extensive analysis requirements for the Advanced Renewable and Distributed Generation Technology program, SMUD hired Pramod Krishnani as a Graduate Student intern in 2008. Mr. Krishnani provided extraordinary technical and engineering support to fulfill the challenging task of advanced statistical analysis and maintenance of solar weather stations installed in Sacramento County. This enabled us to evaluate the significance of solar resource available in Sacramento for the benefits of Sacramento communities.

I am pleased to testify that Mr. Krishnani's excellent knowledge of engineering skills, management, problem solving, fast learning and critical thinking ability has benefited SMUD to excel at highly competitive and challenging tasks. During his student intern at SMUD's Advanced Renewable Energy and Distributed Generation Technology Program, Mr.



Krishnani was pursuing his Graduate degree in Mechanical Engineering at California State University Sacramento with a specialization in Thermal and Fluid System. Mr. Krishnani supported the Advanced Renewable and Distributed Generation technology program at SMUD in the following projects as a student intern:

- **Solar Weather Station Data Analytics:** Mr. Krishnani supported the Solar energy group lead by Obadiah Bartholomy (Senior Project Manager, SMUD Research and Development Department) with comprehensive and exhaustive research related to the statistical analysis of the solar station data. His fast learning skill to learn new software like PVSyst, Microsoft Excel and more; empowered the group to complete analysis of large amount of analysis in a short period of time. This analysis methodology was created and developed by Mr. Krishnani. It was one of the kind of analysis conducted in the department.
- **Satellite versus Ground Station Comparison of Solar Data:** Mr. Krishnani supported the analytical comparison of Satellite Solar data with the fleet of ground solar weather station installed by SMUD in the Sacramento County. This project helped SMUD understand the economic and technical implications of installing solar measurement stations in the Sacramento County.
- **Carbon Credit:** Sacramento Municipal Utility District is regulated by the California Air Resource board and the Environmental Protection Agency to measure the emissions of the CO₂ and NO_x from the cogeneration power plant powering the Sacramento County. Mr. Krishnani successfully completed the data collection and assessment of carbon and NO_x emissions on an annual basis to fulfill these critical requirements for the utility.
- **Technology evaluation:** Sacramento Municipal Utility District's Advanced Renewable Energy & Distributed Generation Technology Program had been receiving several proposals from energy and engineering companies with cutting edge technologies. The program has supported the evaluation of these technologies to assure the right technology to be analyzed, tested and deployed in the Sacramento community to benefit the civil residents of Sacramento County. Mr. Krishnani provided his exceptional support to manage, analyze and evaluate these technologies, so that Sacramento Municipal Utility District could make corrective decision in the selection of advanced technologies. Mr. Krishnani successfully completed the technical evaluation of Solar Power Tower and biomass hybrid system proposal from Lockheed Martin and Starwood in 2009 using specialized analytical tools developed by National Renewable Energy Laboratory. His communication, innovative and creative thinking skills supported the group to analyze the technology in less time and timely manner.

Mr. Krishnani graduated from California State University Sacramento with a Master's Degree in Mechanical Engineering in Fall 2009. Due to his outstanding scientific knowledge, management and analytical knowledge, SMUD hired Mr. Krishnani for a full time position in



April 2009. He was assigned to work under the Advanced Renewable Energy and Distributed Generation Technology Program, which merged with the Customer Research and Development Department, to form the Energy Research and Development Department. During the merging of the groups, Mr. Krishnani supported the senior managers in the role of developing the long term and short managerial strategies of the new research and development department. Mr. Krishnani was the sole technical analysis representative in the department who supported the analytical involvement of the department within research and development projects funded by federal grant and state grants. The Research and Development Projects that he was managing include the following:

- **Sacramento County Solar Variability Assessment:** Mr. Krishnani was assigned to continue the analysis from his intern to analyze the solar variability/Ramp rates of the intermittency of the energy production of the Photovoltaic Power plants to be deployed via the SMUD's Feed-in-tariff program. He successfully completed a detailed statistical and valuable analysis of a 300MW system using his self-developed advanced and complicated calculus tools like Plane of Array analysis tool, Power Plant Efficiency models, Feed in Tariff models and Load regulation models. The results of this analysis was effective enough to understand the challenges which will be faced by the Energy management system of SMUD and other utilities, once the intermittent renewable resources of energy are deployed in the community.
- **Concentrated Solar power Technology Study:** SMUD has always been a pioneer in renewable and clean energy sources. Mr. Krishnani successfully managed the vendor for the evaluation of Concentrated Solar power and storage technology studies conducted by independent engineers "Worley Parsons". Mr. Krishnani supported the vendors with correct guidance with budget control and objectives of the technology evaluation project related to the concentrated Solar Power.
- **Monitoring and Evaluation of SMUD's Roof top Photovoltaic:** Mr. Krishnani was assigned to evaluate the power performance of the Photovoltaic panels installed at the roof top of the Sacramento Municipal Utility district Campus. This project helped understand the power availability of residential and commercial scale PV deployment in the community of Sacramento.
- **Solar Monthly Monitoring Team:** Mr. Krishnani represented the Energy Research and Development team in this multi team meeting to mitigate the issues related to the solar resources assessment conducted by the Integrated Resource Planning Department at SMUD.
- **SMUD's Renewable Energy Feed-in-tariff Proposal Evaluation:** Sacramento Municipal Utility District had released the Feed-in-tariff Request for Proposals to meet the federal regulated Renewable portfolio standards (**RPS**) of 33% by 2020. Mr. Krishnani was involved in the technical evaluation of the proposals received by several companies.
- **Renewable Portfolio Standard:** A Renewable Portfolio Standard (**RPS**) is a regulation that requires the increased production of energy from renewable energy



sources, such as wind, solar, biomass, and geothermal. The RPS mechanism generally places an obligation on electricity supply companies to produce a specified fraction of their electricity from renewable energy sources. Certified renewable energy generators earn certificates for every unit of electricity they produce and can sell these along with their electricity to supply companies. Mr. Krishnani was assigned the task to support the team members to fulfill the analysis to track the renewable energy portfolio standards and the credits earned by Sacramento Municipal Utility District.

- **Load Regulation Study:** Mr. Krishnani was assigned to support the Energy Trading Group and Marketing Group to research the implications of the intermittent Renewable Energy Sources of Solar and Wind on the load requirements of Sacramento Municipal Utility District Customers. His research findings enabled SMUD to understand the challenges to be faced by SMUD to maintain the constant output channels of a power supply to the customers despite of changes in the intermittent supply load.
- **Budgeting of R&D Projects:** Mr. Krishnani was assigned to prepare R&D budgets for the submission of Department of Energy, California energy Commission, California Air Resource Board, California Public Utility Commission Grant request for Proposals (**RFPs**). His judgment from previous involvement in projects helped SMUD to predict correct estimates of the project funding requirements. He was involved in budgeting of cutting edge technologies like Fuel Cell Solar Hybrid and centralized Storage* system. These projects ended up getting acceptance from California Energy Commission, Department of Energy and California Public Utility commission.
- **California Air Resource Board (CARB) Innovative Clean Air Technology (ICAT) 08-3:** The Sacramento Municipal Utility District (SMUD) received ICAT grant 08-3 from California Air Resource Board (CARB) to demonstrate an H₂S removal system for biogas and a NO_x removal system for the exhaust of an engine operating on dairy digester biogas. Mr Krishnani successfully performed the role of field engineer to develop the monitoring system and monitor the performance of this innovative system deployed by the demonstrating companies. Energy Research and Development Department received constant feedback about the progress and effectiveness of the project and its benefits to the California Air Resource Board and the Renewable Energy Industry.
- **Compressed Air Energy Storage:** Mr. Krishnani was assigned to evaluate the Sacramento County for the resource available to deploy Compressed Air energy Storage System. He successfully completed the resource assessment without any support and the results of his research were invaluable for SMUD's Research and Development.



- **Deployment of Solar Weather Station for forecasting Photovoltaic Energy in Sacramento:** Engineering and field support in the California Public utility grand projects of SMUD for the one of a kind deployment of fleet of solar measurement instruments in the complete Sacramento county. His extraordinary analysis is reflected in the published papers at **American Solar energy Society (ASES) (Paper Titles: "Solar Monitoring, Forecasting, and Variability Assessment at SMUD" & "Critical Timeframes of Importance for PV from a Utility Perspective)** and **Institute of Electrical and Electronics Engineers (IEEE) (Paper Title: Validation of Solar PV Power Forecasting Methods for High Penetration Grid Integration)** in 2012 publications at **ASES World Renewable Energy Forum** and **IEEE Power Energy Society** conferences. The analysis is currently used by several solar energy forecasting companies towards the development and enhancement of solar Photovoltaic forecasting services.
- **Community Support:** Mr. Krishnani voluntarily and performed an excellent job by representing the Energy Research & Development Department as a Key Campaigner at the SMUD's Combined Charity Event to raise funds for the better support of the Sacramento Community

Mr. Krishnani recently moved to Belectric Inc. to enhance his career in the solar industry and he is excelling in variety of tasks there. I am glad to testify that Mr. Krishnani to date has made an outstanding contribution in his work to SMUD, to the state of California and to United States as a whole. I expect Mr. Krishnani in the future will continue to help industry and the community to provide Californians with innovative and sustainable energy sources that are environmentally safe and reliable.

I believe that Mr. Krishnani is indeed an individual with extraordinary ability. With no reservation, I strongly recommend his petition for EB-1 to be granted.

Sincerely,

A handwritten signature in black ink that reads "Michael DeAngelis". The signature is fluid and cursive.

Michael DeAngelis
Manager, Energy Research & Development
MS B257, Email:mdeange@smud.org
Telephone (916) 732-6589
Fax (916) 732-6423