

# FARAMARZ BAIRAMIJAMAL

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[www.EVISA-Engineering.com](http://www.EVISA-Engineering.com) [www.ZeroCO2FossilEnergy.org](http://www.ZeroCO2FossilEnergy.org)

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## PRINCIPAL CHEMICAL PROCESS ENGINEER

### PROFILE

Principal process engineer with comprehensive expertise over nearly 31 years in technology development and process optimization in the fossil energy sector for oil and gas, thermal power generation and chemical plants. The experience encompasses midsize and large scale commercial plants, capital projects to over a Billion Dollar face value, from new concept, Front End Engineering Design, then Basic and in many sections Detail Engineering encompassing the material and energy evaluation for the projects in new facilities, as well revamping, de-bottle necking, optimization, retrofitting, and re-powering of existing plants.

Special field of expertise comprises the present-day and near future hydrogen production by steam reforming, gasification technology over syngas, in particular coal gasification for ammonia, methanol, power generation with carbon capture, as well as advanced technology for the reuse of captured carbon dioxide as new fossil energy resource for the syngas, Green Hydrogen, blue Ammonia, and oxygen production, also referred to Zero-Carbon-Emission and Zero-Pollution technologies.

Author of the book "Advances in Sustainable CO<sub>2</sub> and pollution-free Fossil Energy", for reuse of carbon dioxide to syngas generation, Net Zero-Carbon-Emission with emphasis on waste heat recovery to useful energy (i.e. the first new Bairamijamal thermodynamic cycle). These technologies include Advanced Combustion for obtaining high concentrated CO<sub>2</sub> containing flue gas, Dry Reforming, and gasification reactor for CO<sub>2</sub> conversion to syngas. The book is currently in edition with references to public amenable issued patents (vide infra for publications and EVISA Engineering activities).

Specialized discipline in Fossil Energy stands in Chemical Reaction and Reactor Design, both catalytic (heterogeneous as well homogeneous) as well non-catalytic reactors, vide publications and patents.

### SUMMARY OF QUALIFICATIONS AND EXPERIENCE

- SME, Subject Matter Expert in Clean Energy, i.e. gasification, carbon capture for reuse as a new fossil energy resource, CO<sub>2</sub> export as new energy carrier, Temporarily CO<sub>2</sub> sequestration, carbon power and conversion of CO<sub>2</sub> for power generation and to value added products. Expertise comprises in process engineering, specifications for mechanical equipment, comprehensive expertise in process control architecture, control logical, design of special equipment for midsize and large scale plants for various process media i.e. gaseous, liquid, liquefied gases (carbon dioxide, anhydrous ammonia, LNG, oxygen), bulk solid material (powder, granulate, coal dust) as well processing with flammable, explosive, corrosive and dangerous process media (syngas, hydrogen, synthetic oils, molten salt heat carrier, natural gas, etc.).
- The experience includes process development, basic and in some fields detail process engineering, process optimization, evaluation, case and feasibility studies (for economics, financial analysis) i.e. for gasification, syngas and hydrogen generation (for power, chemicals, ammonia, methanol), natural gas treatment, LNG, crude oil treatment, air separation for LOX/GOX, gaseous and liquid oxygen, carbon dioxide purification, condensation (to beverage grid), nitric acid, urea and melamine plants. Engineering of these plants spans in high pressure (e.g. ammonia, methanol, carbon dioxide, steam reforming, gasification, urea, and melamine), middle and low pressure plants (e.g. nitric acid, CO<sub>2</sub> removal via AGR, SNG, and desulfurization). SME experience includes site and project evaluation, technical and financial feasibility study; supports for legal contractual affairs as well permitting and approval procedure with authorities and regulative agencies. The background in power generation encompasses fossil power generation with gas turbine (GE and Siemens CTs in

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simple/combined cycle), fuel treatment and conditioning, HRSG for steam generation and steam turbine for state-of-the-art as well as engineering and proto-design of advanced sustainable fossil energy technologies (i.e. sliding pressure operation for CO<sub>2</sub> cycle, ultra-superheated Direct Steam generation, syngas turbine, oxygen turbine). The process engineering in power generation comprises the fossil energy only (vide patents and publications in power generation).

- Specific field of expertise in chemical reactors comprises conception, operation, process control and detail mechanical design of chemical reactors for both catalytic and non-catalytic reactors; endothermic indirect fired reactors (e.g. primary steam reformer with CH<sub>4</sub>/H<sub>2</sub>O, dry reformer CO<sub>2</sub>/CH<sub>4</sub>), exothermic direct fired reactors (e.g. gasification of crude oil, coal, nitric acid reactor), indirect heated/cooled reactors (ammonia, methanol, CO water shift converter) and non-catalytic reactors (urea, melamine), vide patents and publications in chemical engineering.

## **SUMMARY OF EXPERIENCE:**

- Lead process design engineer for energy and chemical plants as well in conventional and gas turbine power plants, involving FEED, detailed engineering, construction and commissioning supervision. Process engineering comprises site evaluation, plant island arrangement, plant operation analysis, environmental approval and permitting procedures, detailed process control architecture, process simulation, HAZOP, HAZID, Risk Assessment, safety pressure relief and flare criteria (e.g. for methane, syngas and hydrogen) with the relevant Standards and Codes. Skilled conventional and advanced power generation with expertise in coal gasification, gas turbine, IGCC, and carbon dioxide power cycle, high pressure ultra-superheated Direct Steam generation. Design lead engineer for fuel gas processing by fuel gas cleaning, preheating, conditioning, pressure control system for the gas turbine power plants, and auxiliary units for HRSG, multistage turbines for steam generation, CO<sub>2</sub> recovery, oxygen, syngas and off gases, including the re-superheating sections. Skilled in commissioning of industrial plants i.e. loop tests, functional tests, fine tuning of control valves, stabilization of steady state mode of operation, by-pass operation of turbines, steam balancing, load rejection. Experience includes utility plant units for cooling water, electrolysis for hypo-chlorination (in pulp and paper industry), cooling tower, MSF, DEMIN and BFW preparation, condensate polishing. Senior process engineer for evaluation and result assessment for upgrading commercial plants in process development, implementation of new technologies, improvement, or optimization of existing operation for increase of plant output, validation of new/alternative technologies. Duties have included technical presentations to existing and new customers, financial audience, authorities for permitting and supports for proposal department. Experienced in planning, construction and operation of plants based on U.S. and international codes, standards and regulation e. g. ASME, API, NFPA, NACE, ATEX, AD 2000, DIN, Explosion Protection Zones, and European Standards e.g. TUEV, DVGW for hazardous, flammable, explosive and corrosive process media according to OSHA and EHSS Standards

## **EDUCATION AND PATENTS**

- MS (MSChE) University of Erlangen/Nuremberg, 1990;
  - Mathematical reactor modeling and reactor design for heterogeneous catalytic Dry Reforming of methane/carbon dioxide reaction for syngas generation. Facility erected and proven in Stuttgart –Germany in the German Aerospace Institute.
- BS (BSChE) in Chemical Engineering from University of Erlangen/Nuremberg, Germany, 1987.

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- Area of concentration: Characterization of magnetic properties of heterogeneous catalysts on partial oxidative methane reaction to higher value fuels.
- Both works had been accoladed with summa cum laude under direct auspices of Professor DDr. Hanns Hofmann in Chemical Reaction and Reactor Design Institute at the University of Erlangen, Germany.
- University of Erlangen/Nuremberg, Germany is an ABET accredited university.
- P.E. (equivalent), Austria, in Chemical Engineering since 2002.

## **APPROVED PATENTS, PATENT APPLICATIONS, PUBLICATIONS, AND INNOVATIONS:**

- Extension of the patent US 16/820, 610 on June 08, 2020 with the embodiment for CO<sub>2</sub> containing side streams processed for generation of high temperature process heat and syngas by use of Dry Reforming via gasification.
- US patent application US 16/820, 610 of March 16, 2020 for flue gas oxyfueling (more commonly termed later by United States Department of Energy as "Advanced Combustion") as the first patent in continuation to US 61/850, 685 with the priority date of February 21, 2013.

United States Patent and Trademark Office issued a patent for this process invention on April 28, 2022 with the final proceeding for the certification ongoing.

- International patent application US 61/850, 685 (referred to CPCE, Carbon Power and Chemicals Economy) with the priority date of February 21, 2013 with the PCT/EP2014/000443, PCT as of February 19, 2014, wherein two new thermodynamic cycles have been introducing for capture and conversion of liquid CO<sub>2</sub> to high-value Green Products over the syngas and oxygen, obtained from the CPCE's high pressure low temperature electrochemical syngas generator, HPLTE-SG.
- PCT WO 02/12206; High pressure melamine reactor cascade for melamine manufacturing PCT/EP2005/008323.
- High-pressure vertical multistage melamine reactor PCT/EP01/07039.
- Total high pressure dry process for production of pure melamine
- Three international patent applications in the field of fuel gas supply (Syngas, NG) and conditioning for gas turbine based power plants; reserved for Siemens Energy Inc., Orlando, FL.
- PCT/US 2010/002482 Process invention for high pressure dry continuous supply of single precursor or blended material e.g. coal/petcoke/biomass to pressurized gasification reactor (publication No. US- 2012-0182827-A1 with the publication date of 07/19/2012). EP patent granted on May 06, 2015.

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- Conception and detail design of a new gasification reactor, currently in development and preparation

## **EXTRACURRICULAR ACTIVITIES TO THE ADVANCEMENT OF THE WESTERN PHILOSOPHY:**

An avid devotee to the Western Philosophy, from the fundamental principles as reflected in the Old and New Testament to the present time with particular emphasis for the commencement of the Western Culture with the enactment of the Seven Laws post the Great Flood to Noah; the begin of the Western Civilization for republicanism, democracy, rule of law, and the uncompromised proposition that all mankind is created equally by Creator with the three unalienable rights founded by Father Abraham, and reaffirmed by the High Priest; as well as the outset of the Western Mentality with the dispensation of the Ten Commandments, up to the Cyrus Cylinder decree, the rise of Christianity, Magna Carta, into the Age of Enlightenment, the Common Wealth principals, to the U.S. Constitution, the Gettysburg Address, amid others yet all to the order of Abraham, then to present day obligations and unwavering commitments for life, liberty, and pursuit of happiness.

The current activities imply for instance the upholding of the United States democracy -the crest of the Abrahamic Civilization in our age- safeguarding conservatism, and republicanism (supporter of Lincoln Project). Yet, most decisively, the persuasion of the dissolution of the countries and nations of Austria and Germany by the verdict of all nations' vote on the U.N. General Assembly at large impaneled by the U.N. International Criminal Court for their egregious multitudes of crimes' counts against ca. 25 millions of minorities from all races and ethnicities at the present time alone; vide publications of Holocaust Today organization e.g. Mission Statement, Precept for Transparency, Open Letter to His Holiness Pope Francis, and others amenable in [www.HolocaustToday.org](http://www.HolocaustToday.org) for further references.

## **MEMBERSHIPS:**

AICHE; American Institute for Chemical Engineer, since August 2010

Member of Good Shepherd Lutheran Church in Gaithersburg, Maryland, since May 2010

## **CITIZENSHIP:**

United States citizen with no second citizenry; eligible for attainment any class of Security Clearance.

## **LANGUAGES:**

English and German, both at business level

Farsi (mother language, high school level)

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## PROFESSIONAL EXPERIENCE IN CHEMICAL ENGINEERING

EVISA-ENGINEERING LLC, ROCKVILLE MD

### Principal Chemical Engineer

May 2015 till present

Various contractual assignments either directly under EVISA Engineering LLC, or as sub-contractor or assigned via Personnel Resourcing Companies for fossil energy, chemical plants, power generation, the pulp and paper.

Most recent assignment had been in the metallurgical sector for a U.S. Defense Department's associated company for June 2022 till November 2022, with a Personnel Resources Company. Three main projects have been commenced, each one either conceptualized for a new technology, prepared in Basic Engineering for plant optimization, and two solutions worked out, all together to the extent of several tens of Millions of Dollars additional revenue. The solutions were handed down to site's senior process engineers for detail engineering and executions.

- Commercialization procedures of CPCE process for upgrading of nearly 4000 existing CO<sub>2</sub>-emitting plants, mostly in the power generation, to Zero CO<sub>2</sub> Emission and Zero-Pollution plants (i.e. the post-combustion carbon capture and conversion applications of the CPCE)
- Platform for United States National Civil Action to resolve the Global Warming via the available three commercially viable solutions now (vide website)
- FEED and preparation of project financing for loan guarantee program for de-chlorination of biomass in a pletting plant, ongoing
- Principal Project in several midsize plant and projects including FEEDs, Case Studies, techno-economic feasibility analysis
- Edition of a book in sustainable advanced fossil Energy for carbon free chemicals (ammonia/methanol) and fossil energy by reuse of captured CO<sub>2</sub> to syngas and hydrogen with the title "Advances in Sustainable Carbon-Free Fossil Energy" for power generation, transportation fuels and production of commodity chemicals.
- Detail conception and design of a new high performance advanced gas turbine with total carbon capture under oxy-fueling operation

### United States National Civil Action

September 09, 2019 till present

None-profit organization founded to advance the technological feasible and profitable solutions to resolve the Global Warming and secure the existence of currently operational fossil energy plants, as well the coal mine, shell oil&gas productions.

[http://www.evisa-engineering.com/data/civil-action/pdf/US\\_NCA\\_Objectives\\_Criteria.pdf](http://www.evisa-engineering.com/data/civil-action/pdf/US_NCA_Objectives_Criteria.pdf)

EVISA-ENGINEERING, ROCKVILLE, MD

### Principal Chemical Engineer

June 2014 till April 2015

Site energy and process optimization with increase of reactor performance, generation of ancillary steam with heat recovery as well the feasibility study for a Power Island (CHP, CoGen, industrial gas turbine

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CC) in a chemical manufacturing site in United States. This service comprised also a new improvement in processing with major business effect with a patent disclosure in favor of the client.

EVISA-ENGINEERING, GAITHERSBURG, MD

## Principal Chemical Engineer

November 2009 - April 2014

Consulting engineer in various projects pertaining process and power engineering, technology assessment, chemical engineering, process analysis and technology development in power generation (coal, gas turbine, bio mass) and chemical plants (revamping, repowering, de-bottle necking, energy efficiency, process optimization and modification).

Consulting contract in 2014 in cooperation with ProEnergy Inc. for engineering and commissioning services for Arabian BEMCO and SEC Saudi Electricity Company in Saudi Arabia associated with the 3800 MW gas turbine combined cycle blocks in Qurayyah, Block#6, PP10 and PP12 the world largest gas turbine power plant in KSA. These services comprised the solutions for plant curtailments, pre-commissioning procedure, Chemical Cleaning, steam blowing, by-pass operation and steam admission to the turbine, overall Performance Test Guarantee Runs to ASME PTC 19.1, ASME PTC 6.0 and ASME PTC 22.

## Noramtec Consultants, Inc

April 2008 – August 2009

(projects in Orlando, FL and Kansas City, MO)

Senior process chemical engineer contracted for Siemens Energy Inc. and SEGA in projects for international gas turbine power plants and Integrated Gasification Combined Cycle (IGCC). Responsible for chemical process engineering, customer supports, oral and written presentations, start-up, shut-down and flare system procedures. Projects included Secure Energy Inc. (in Decatur, IL) Coal to SNG gasification as well as natural gas conditioning and supply for the power plants BREAMAR 450 MW with three SCPP, Queensland, Australia; and NEERABUP 300 MW with two SCPP islands, Western Australia.

## TBFA Fischer, Bodenheim, Germany

June 2005 - March 2008

Senior design engineer for natural gas supply and conditioning for Siemens F and H Class gas turbine power plants in SUGEN 1100 MW re-gasified-LNG consisting of three CCGT power blocks in India; and 750 MW SUMGAI consisting of two CCGT power blocks in Azerbaijan.

## TB Engineering, Linz, Austria

June 2000 - May 2005

Senior process engineer for engineering, consulting, technology improvement, technology assessment and project management for numerous chemical, power generation and process industry customers in Europe.

## Agrolinz Melamine Borealis, Austria

August 1991 - March 2000

Technology manager for primary products for fertilizer manufacturing supporting many plants e.g. large scale ammonia, nitric acid, urea as well as commercial gas production (CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>, Ar, He), melamine and other nitrogen-based chemical production facilities. Provided system and process design, operations engineering, pollution control and permitting support, technology improvements, development of new processes, economic and safety retrofits, safety and hazards evaluation.

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## **Frauenaurach Municipal & Coal Power Plant, Germany**

June 1990 - June 1991

Plant assistance for process engineering in a 420 MW coal-fired power plant utilizing dry process operation for flue gas desulfurization and cycle optimization activities to enhance profitability through economical design techniques.