ARBOR CONSULTANTS, PC
2902 East Eisenhower, Ann Arbor, MI 48108 • (517) 416-4721

September 20, 2024

City of Ann Arbor
Attn: Colin Spencer, Purchasing Manager, RFI #24-49
301 E. Huron Street
Ann Arbor, MI 48104

Reference: City of Ann Arbor (AA), Request for Information (RFI) RFI# 24-49, Sustainable Energy Utility (SEU) Consulting

Subject: **Submittal of Interest, Arbor Consultants, PC**

Dear Mr. Spencer,

Please find attached our response to the referenced RFI, seeking pre- and post-vote consulting support as SEU formation is starting to accelerate. As indicated in the RFI, we did not attempt to form a team so as to provide pricing to complete all tasks specified and understand that the next step the City intends to take is to review all submittals for relevancy and value in completing pre-election readiness tasks and to be able to nimbly move forward after the SEU receives positive response.

As detailed herein, I believe Arbor Consultants, PC can bring a very unique set of skills necessary to assist the City of Ann Arbor ("City") in SEU study and setup:

- Over (43) years of experience working with the in-state investor owned utilities, municipalities, Michigan Public Power Agency (MPPA), transmission owners (ITC and ATC), and many developers and other industry participants.
- Design, construction, finance, and operation of many utility-scale solar PV, wind, battery storage, and hydroelectric generating stations and distribution circuitry nationally. Developer of the first battery storage projects and active microgrids in the State, including both ahead-of-meter and behind-meter configurations. Design and analysis of the first solar and storage projects for residential and commercial customers in Ann Arbor.
- Detailed experience with electric vehicle charging, being a first adopter, as well as with vehicle to grid (V2G) power transfer and off-grid arrangements.
- Decarbonization assessments at four City buildings and a plethora of private commercial and residential buildings, as well as responsibility for many solar PV projects throughout the City and State including those for OSI and Parks & Recreation. Knowledgeable across all Michigan building codes in use or soon to be released (energy code update).
- Geothermal design, construction, and contracting strategies at many buildings including Arbor Brewing and support to the City for the Bryant district geothermal grant program and Community Center.
- Familiarity with virtual power plant (VPP), contracts for difference (CfD), and power purchase agreements with third parties as well as the Foote Act and City's ordinances related to utility franchise agreements.

ARBOR CONSULTANTS, PC
2902 East Eisenhower, Ann Arbor, MI 48108 • (517) 416-4721

- Leadership on the first commercial project in the State that will generate carbon dioxide removal credits (CDRs) via permanently sequestering CO2 extracted from an energy project underground in former natural gas-bearing formations.
- Long-term technical relationships with the U.S. Department of Energy, DOE), National Renewable Energy Laboratory (NREL), and other national laboratories.
- Alignment of how an SEU can assist the City in achieving A2ZERO goals. Over 16-years of dedicated service to the City's Energy Commission and co-author of the City's Climate Action Plan and Sustainability Framework.
- Co-author of national standard ASCE/COS 73-23 on sustainable infrastructure, which includes decision tools for selecting projects with the lowest lifecycle carbon footprint least lifecycle cost, and impact on social equity.
- Work from an in-City office with the ability to also operate from City Hall or other office space via foot or bicycle (non-carbon) transportation. Ability to dedicate 40 to 80 hours per week of professional time towards the City's pre- and post-election SEU goals with low compensation and ability to operate either as a consultant (meeting all City contract requirements) or as a direct-hire without need for benefits.

Notably, Arbor Consultants has partnered with, worked for, and has the ability to easily align with many other consultants and organizations. We purposely did not make any attempt to formally align/team with these entities as part of this RFI submittal. We do have the ability to pull in firms with specializations in a variety of areas where Arbor has familiarity but does not have the depth of resources or experience, including municipal finance and tax credit compliance, utility rate derivation, and State government relations. Please see the attachment for additional feedback.

Please contact me at your convenience should you have any questions or concerns.
Thanks.

Chuck Hookham

Chuck Hookham, PE, MBA
President
MI Registered Professional Engineer 62010-34897
Ann Arbor STEAM# CONT 23-3901
Ph. (517) 416-4721
cjhookham@yahoo.com

Enclosures
1. Detailed RFI Response
2. Resume for C. Hookham

City of Ann Arbor RFI 24-49, Sustainable Energy Utility (SEU) Consulting Response

Arbor Consultants, PC lifted primary work tasks from the City's RFI and placed text below, with its feedback on how work tasks would be addressed such if selected to participate, in *italics.* Based on both experience and availability, Arbor believes Chuck Hookham can provide significant benefits in a Project Management role, reporting to OSI and the City Manager and integrating OSI and other City resources to the extent possible to advance SEU definition before and after the November, 2024 election. This perspective is based on his familiarity, physical location, extensive experience, and ability to work and communicate with third parties and City/OSI with OSI without impacting its other significant commitments and actions.

PHASE 1 – EXPLORATORY (tasks may be performed pre- or post-public vote):

1A. Operational Tasks

- Assist in determining the optimal organizational structure for the SEU (e.g., separate department of the City, external authority, agency, other?) and helping to operationalize this structure. This includes exploration of an external advisory board and how best to structure said board, should it be recommended. *Arbor helped author and select the consultant for the first City municipality/SEU study and has uniquely been engaged with other public-facing power organizations in Michigan and abroad.*
- Assist in creating a staffing plan for the SEU based on a well-organized energy service deployment schedule and structure. *Establishing a viable resource-loaded work plan with credible schedule is critical to overall SEU success. The SEU will require some skills outside the current OSI team particularly in finance, contracting, and engineering areas that will require inherent knowledge and avoid the need to learn-on-the-job. Our industry experience will greatly help filling in staffing.*
- Develop a service deployment plan and schedule, including details about which technologies to deploy first, where, how to determine deployment timelines and geographical areas of focus, when to phase in new offerings, how to sequence improvements, how new customers qualify and a decision-making framework to determine when and how to expand service offerings or geographical deployments.
- Develop a customer recruitment and retention plan.
- Identify administrative and/or legal issues that need resolution and work with team to resolve (e.g., easement needs, bring your own device programs, etc.).
- Provide detailed recommendations on how to structure the billing system, permitting system, and design review process for the SEU.
- Provide detailed recommendations on any additional hardware or software the City should procure to operate the SEU.

1B. Economic Tasks

- Support identification of funding streams to launch the SEU. Including aiding in grant writing, investor recruitment, PPA model evaluation, and/or meetings with bond agencies to support securing the capital necessary to launch the SEU.

1C. Technical Tasks

- Technical recommendations on how to maximize value to customers and manage any inadvertent side effects associated with widespread solar and energy storage system deployment in a small geographic footprint. *The latter point is repeated and answered below. The former point is important to properly execute to benefit Phase 2 activities.*
- Evaluation of MISO participation by the SEU. *MISO participation would not occur until later in SEU development when generation resources may interface with the distribution grid and the SEU is treated as a "load-serving entity (LSE). Preliminary discussions would be held with MISO to discuss all possible interface points from market participation through LSE rules in parallel to, or in place of DTE's current obligations in Phase 1.*
- Technical recommendations on how to manage geothermal installations given the 1,4 dioxane groundwater plume that affects much of the City. *All geothermal systems employed in AA should be closed loop to reduce any contact or risk. Rules for issues such as system leak detection, automatic isolation, and response time to leakage events would be established in Phase 1, along with issuing a risk register of all the possible impacts from dioxane within said system and how to mitigate such.*
- Technical recommendations on how to manage any inadvertent side effects associated with massive geothermal deployment in a small geographic footprint. *Key technical issues to be explored include long-term effects of City system wells on geo-exchange (heating/cooling) performance, ability for system capabilities to grow with new customer attachments, staging of construction and commissioning, and avoidance of scenarios wherein cold- or hot-weather system malfunctions elevate risks to user customers.*
- Technical recommendations on how to manage any inadvertent side effects associated with massive solar and energy storage system deployment in a small geographic footprint. *Ability of SEU-controlled solar and storage systems (collectively DERs) with DTE's distribution system, including paralleling and islanded operations and rigorous communications and telemetry systems are the primary focal points, particularly since DTE has been very challenging to work with from a "grid interaction" perspective. Arbor worked on a few initiatives that captured "how" this can be done as part of ASHRAE's "Grid Interactive Buildings for Decarbonization" series.*

1D. Engagement Tasks

- Support determining and managing the public's expectations regarding SEU program deployment and service offerings. This will likely include creation of an SEU deployment timeline and schedule along with visuals that the public can use to rapidly assess when SEU-related services will be available in their geographical area.
- As needed, support responses to correct any errors or misunderstandings regarding information about the SEU circulated in the public.

Each of these tasks can be swiftly and successfully executed through widely communicated charettes, questionnaires, and surveys engaging residents and businesses, using resources such as A2ZERO's program ambassadors. The SEU deployment timeline is a Phase 2 activity.

PHASE 2 – EXECUTORY (tasks may only be performed after a vote authorizing the SEU):
Arbor assumes a start date in early November, 2024 after the election is complete.

2A. Operational Tasks

- Draft, in collaboration with City staff, standard specifications for SEU and/or City staff to use when designing and permitting SEU-related infrastructure. *This is important for future integration but an "SEU master plan" is first needed to define infrastructure development and need for specifications. Arbor has written standard specifications for many forms of infrastructure from building systems to water and electric utilities to draw from.*
- Draft design review standards for City staff to review, especially for SEU improvements that interact with the right of way. This includes basic standards and construction standards, as well as designing and implementing staff training on the new standards. *See previous – design review standards will be established in parallel with standard specifications such that integrated system of documentation is established. Robust document control, data management, and IT/OT interface systems are also needed.*
- Engage with regional stakeholders, including the County, to ensure they are aware of the SEU and that any regional operational issues, such as geothermal permitting – which is done at the County level, are understood before SEU launch. *Correct, a permit matrix will be developed along with a "customer integration plan" that details how the SEU operates, financial implications, service expectations, and a plethora of other topics including system ownership and abnormal operating conditions.*
- Create a rate model and assist the City with setting rates for the services delivered by the SEU. This rate model must be compliant with Michigan law, including ensuring that rates qualify as fees under *Bolt v City of Lansing*, 587 NW2d 264 (Mich 1998). *This is a significant task, to be undertaken by a firm with specialty skills such as HDR's utility/economic team. Arbor can bring this expertise or can work with a City-selected consultant in execution. This task will influence the Phase 2 overall timeline.*
- Support meetings with DTE to ensure all interconnection processes for joint customers are well understood, streamlined, and any new interconnection processes necessary are put in place before program deployment. *This task is necessary, but there needs to be an " SEU master plan" established to define interface points and operational issues such as wheeling of renewables into DTE's system, in-City generation/storage, and parallel/island configurations in terms of each metered service in the City.*
- Create termination provisions for those that leave the SEU. *See "SEU master plan" below.*
- Create a job description and assist in recruiting and interviewing candidates to serve as the SEU Director. *This task is relatively straightforward and can be managed with City's Human Resources group.*

There was not an "operational task" defined to create an "SEU master plan", which will underpin all aspects of SEU scope, ownership, responsibilities, DTE interfaces, revenue and cost management, resources, scheduling, financing, and integration into the City of Ann Arbor's fabric. Even basic matters such as how the SEU fits within the organization chart or how such will be financed need to be clarified. This task needs to be started upon in latter in the Phase 1 activities set, so as to form a reference upon which Phase 1 activities can be deemed complete.

2B. Economic Tasks

- Update, as needed, existing SEU economic model and provide specific rate projections, revenue requirements, operational needs, and debt service (as relevant) for various service offerings. Model must include details about when the SEU is optimized to add new services or expand into new geographic areas of the City. To the extent the SEU provides supplemental economic value to the City's general fund, those values should be clearly identified.
- Analyze the unique costs associated with deploying networked geothermal throughout target geographies of the City. Economic analysis should include costs associated with right of way restoration, economic and technical impacts to other utilities that occupy the right of way, and any other variables the City should consider as it explores providing networked solar, storage, and geothermal services throughout the City.
  These two integrated economic and modeling tasks are critical to the success of Phase 2 execution and will require some dedicated resources familiar with cost estimation and rate making. Arbor can bring this expertise to the City, or other means of engagement are possible. Completion of these two tasks will likely be on the critical path" from a timeline point of view, along with the paralleling operational task of establishing an "SEU master plan". Starting points are work that Five Lakes/NewGen Strategies (2023) and Stratagen (2024) completed for the City along with any review feedback from City stakeholders and clarity that can be added by the City Manager and City Council.

2C. Technical Tasks

- Analysis of deployment of initial solar + storage systems to explore the likelihood that microgrids can be created at a later phase. Includes detailed analysis of the technical parameters that need to be met as well as hardware and software necessary to operate this system. *Arbor has significant experience in this space based on operational microgrids in other locations and continued following of technical requirements and related codes and standards (e.g., Michigan Electric Code, NFPA 855, others). Early consulting to the Veridian Project also offered understandings of DTE's perspectives on how such were to be configured. There are also some law changes that may be necessary to enable some of this technology to be deployed to maximize its value. Arbor has worked on many of the solar and solar + storage projects that already exist – how such can benefit the SEU needed to be explored along with new opportunities for systems on City, County, and large property oner roofs that can be integrated together – these need to be overlaid with DTE's distribution system to define how to best service City residents and businesses.*
- Potential support with launching, operating, and maintaining a networked geothermal installation in the Bryant neighborhood of the City. *There are other "lessons learned" such as from IDEA, Eversource, and DOE's Geothermal Technologies Office, to build upon all the community engagement and workforce development tsks that have been completed to-date. There needs to be further thought on ownership, responsibilities, telemetry and service accounting, and troubleshooting for sure, and this can be accomplished in parallel to considerations for other district systems such as in the downtown corridor and that being constructed by University of Michigan. This can be accomplished by a core team.*

2D. Engagement Task

- Support the development of public educational materials about the SEU and its program and service offerings. *Arbor has worked with third parties who excel in this space and would encourage their engagement, either directly by the City or via Arbor subcontract. The existing OSI engagement team and A2ZERO ambassadors would also be critical players in this activity.*

ARBOR CONSULTANTS – RESOURCES, FEES, AND EXPERIENCE BASE

- Number of staff available to commit to each area of work along with staff's qualifications. *Arbor is comprised on one principal (C. Hookham) and many associates who support contracted work assignments, ranging from professional engineers and designers through testing laboratories, construction contractors, and other organizations. Arbor has the ability to quickly bring in specialty contractors and ensure that such bring needed expertise and value.*
- Hourly rates for each staff member that could assist with the tasks noted above. *Hourly rates vary from $50 to $125.00/hour when providing services as a contractor to customers. If hired directly by the City, salary rates are very flexible and austere.*
- Anticipated cost for each individual activity/task and the aggregate estimated cost to complete the full scope of services. *Anticipated costs to self-complete Phases 1 and 2 are not possible to estimate at this time. If Arbor were to participate as a Project Manager and the resources of other parties were to be utilized, the following costs were estimated based on descriptions above and timeline below:*

Cost Base/Phase	***Phase 1 – Exploratory***	***Phase 2 – Executory***
Arbor Consultants (PM Role only)	*$50,000*	*$170,000*
Other Arbor Consultants costs (select tasks)	*$35,000*	*$100,000*
Third Parties (estimated for other tasks)	*$110,000*	$225,000
TOTAL Estimate	*$195,000*	*$495,000*

- A proposed timeline by which tasks could be completed, with completion dates estimated for each task. It should be assumed that all tasks must be completed within 12 to 18 months of project start date. *Please see following statements concerning timelines for each phase:*

  Phase 1 – Exploratory
  Operational
  Economic
  Technical
  Engagement

  Assuming an aggressive Phase 1 start date of October 15, 2024, Arbor believes that all Phase 1 tasks can be completed in three months from award.

Phase 2 - Executory

Operational – preparation, review, and issuance of an SEU master plan is believed to be the most critical Phase 2 task, with at least a six-month timeline needed given the many inputs. This task requires some inputs on rates and overall SEU scale and so it cannot be immediately started.

Economic - This is most critical Phase 2 task and must be started as soon as Phase 1 insights on rates and SEU configuration are confirmed.

Technical - Technical tasks are all on-point, but require the "SEU master plan" in order to execute so their delivery could end up being on the overall Phase 2 "critical path".

Engagement - Engagement tasks are non-critical, but require the insights from the "SEU master plan" and rates packages so as to develop proper messaging.

Assuming Phase 2 must be preceded by many of Phase 1 exploratory tasks, Arbor believes such can be accomplished in 15 months but this is contingent on the amount of time necessary to create and adopt the "SEU master plan" described earlier.

- Previous experience working on similar tasks with at least three examples and no more than 10 previous examples shared. *Because SEU set-up will effectively be first-of-a-kind, it is difficult for any organization to point to prior similar experience. To overcome this gap, Arbor Consultants did reach out to both the State of Delaware and Washington DC SEU teams to discuss best practices and lessons learned and this intelligence is invaluable to proper SEU set-up in Ann Arbor. We do have similar experience with VPPA contracting, with entities including General Motors, Facebook, McDonalds, and MPPA. It will be important in pre-election work to take advantage of time to work through SEU configuration, formation, and key short-term goals, particularly since A2ZERO's 2030 commitments require immediate attention.*
- Details verifying an understanding of the Michigan energy ecosystem. *Over 43 years developing, building and operating generation and distribution resources (electricity, natural gas) throughout Upper and Lower Peninsula, with services ranging from design, construction, and commissioning. Extremely familiar with Michigan (MISO Zone 7) grid operations and day ahead/real time/ancillary services markets and operations. Few individuals possess more experience on the Michigan grid and its functionality based on roles served.*
- Details verifying an understanding and previous experience with ratemaking. *While at Consumers Energy, C. Hookham worked with the Rates Department to solve and offer rate services to customers under unique configurations ranging from large industrials (Hemlock Semiconductor, Graphics Packaging, others) through smaller distributed energy resources (e.g., renewables, storage) including those with the Jackson Smart Energy District and first apartment building microgrid wherein smart thermostats, water heaters, and other equipment were leveraged in lowering tenant energy usage/cost with microgrid adding resiliency.*

"Failing to adopt new strategies and technologies is the higher-risk path for utilities today," said Jigar Shah, director of the U.S. Department of Energy's Loan Programs Office, September 9, 2024. *Jigar is speaking directly about the transition to clean, local energy delivery such as in the form of an SEU. However, there will be a need for DTE's parallel improvements in its distribution system reliability and willingness to expand on "grid interaction" to enable the SEU to deliver upon its goals associated with City decarbonization, energy cost savings, electrification, and electricity reliability improvement.*

Chuck Hookham, P.E.

Contact Data
2902 East Eisenhower Parkway
Ann Arbor, MI 48108
Cell: (517) 416-4721
E-Mail: cjhookham@yahoo.com

Education
Post-Graduate Coursework in Renewable Energy Systems and Interdisciplinary Technology

Master of Business Administration (MBA), Finance, Eastern Michigan University

Bachelor of Science, Civil Engineering, University of Illinois, Urbana-Champaign

Professional Registrations
Professional Engineer, Michigan
No. 6201034897 (active)

Professional Engineer, Ohio
No. 90262 (active)

Professional Engineer, FL, IL, MN (inactive)

Professional Affiliations and Appointments
- Founders Societies*, Carbon Management Committee*
- American Society of Civil Engineers (ASCE)
- Elected to ASCE Nat'l. Board of Direction (2013) as At-Large Director
- American Clean Power Association and Electric Power Research Institute *(renewables, energy storage committees/groups)*
- Engineers Without Borders
- ASCE Committee on Sustainability (co-author of ASCE/COS 73-23)

Other Appointments/Boards
Appointed by Gov. Rick Snyder to State of Michigan Board of Professional Engineers (2014); reappointed 2018, Chair 2021-22

Energy Commission, Ann Arbor City Council (2010-2023); co-author of City's Sustainability and Climate Action Plans

Washtenaw County Board of Commissioners, *Building Code/Construction Board of Appeals (2017 to present)*

Michigan Energy Options (non-profit), elected to Board of Directors (2022 to present; elected Secretary in 2023)

Professional Awards
- Stephen Bechtel Jr. Energy Award (2014), ASCE
- Innovative Entrepreneur Award (2022), Great Lakes Renewable Energy Assoc.

Other Qualifications
PMP Qualified (project management)

➢ PROFESSIONAL SUMMARY

Mr. Hookham has experience on a variety of infrastructure, buildings, communities, business administration, utilities, and process operations ranging from permitting, development, and site studies through finance, management, and operations/maintenance. He has managed full-scale EPC delivery on major commercial, industrial and energy projects throughout the Americas. He has also served as operations director for project management and been extensively involved in budgeting, capital cost estimation, contract negotiations, expert witness, sustainability, and risk assessment. Common results on projects and businesses led are on-budget performance and schedule adherence, while maximizing staff engagement, efficiency, and communications, and with zero injuries. Operationally, he has been responsible for staffs to 200 people, profit and loss, and business development. Since early in his career, he has been actively involved in optimizing operations/maintenance, working with union/non-union labor, zero safety incidences, and high performance; he firmly believes in "beginning all tasks with the end in mind" and maximizing teamwork. He recently co-authored the national standard on sustainable infrastructure with a diverse committee and has focused on defining and implementing strategic planning throughout his career.

➢ EXPERIENCE SUMMARY

A. Arbor Consultants, PC (2006 to Present)

Founder/President of a multi-disciplined consulting engineering and construction management firm, focused on advancing the transition of energy (generation, transportation, and usage), manufacturing, and transportation systems to clean, low-carbon solutions. Significant experience with ground and rooftop solar PV and geothermal systems, battery storage, structural engineering, air- and ground-source heating/cooling, energy audits and efficiency improvements of buildings, and energy resource planning. Consultant on off-grid electrification, building decarbonization, vehicle charging, data center, bioenergy, carbon capture and sequestration (BECCS), vehicle-to-grid (V2G), hydrogen, microgrid, and building safety projects. Customers include municipalities, developers, and corporations. Recently served as lead developer for three Midwestern 25 MW+ solar PV projects in MI and OH for a foreign investor completing due diligence, risk analysis, and permitting. Long-term consultant to the U.S. Department of Energy on renewable energy and energy storage project implementation and climate adaptation including development of recommendations for Puerto Rico energy systems.

B. CMS Energy (March, 2016 to March, 2024)

Executive Director of Projects/Renewable Energy Operations for NorthStar Clean Energy and statewide storm planning chief for Consumers Energy's electric utility. He served in various technical/financial/operations leadership roles on multiple renewable energy (wind, solar PV), T&D, and power system upgrades for Consumers Energy and large customers. He managed a staff responsible for large renewable energy assets in the U.S., with focus on incremental availability/production improvements. His staff also led IT/OT systems and cybersecurity across fleet operations. He managed development/construction of the U.S.'s second utility hybrid (*wind/solar/battery*) in Ohio and was Vice President of CE's ES Services and CMS's Gas Transmission businesses. As executive in charge of the 525 MW Aviator Wind Farm in TX and 250 MW Newport Solar Project in AR, he interfaced with the CMS Board, regulators, worked with investment/equity partners, and led growth in financial returns even in the face of multiple severe storms and power outages. Skills utilized included project/corporate accounting, financial reporting, sustainability, environmental risk, and presentations to management. He also led many diverse permitting actions including storm/industrial NPDES, special use, and bat habitat conservation plans.

Envision™ SP Qualified (sustainability)

Papers and Presentations
Over twenty authored papers and presentations at technical conferences and seminars, on energy systems, power generation, sustainability and aging management. Invited panelist at 2011 PowerGen Financial Forum (Technology Risks) and 2013 Michigan Energy Forum, judge at 2013-2014 and 2014-2015 University of Michigan Ross Renewable Energy Case Competition; featured speaker at Michigan Infrastructure Conferences (2014, 2017), Civil Engineering Triennial Summit in London (2015 and 2018), and keynote speaker and panelist at ACEEE Financial Summit (2017)

Testified to Energy Subcommittee, U.S. House of Representatives, Energy and Commerce Committee (2017) on energy infrastructure investment needs, policy topics, and hydroelectric generation

Volunteer Activities
Long-term contributor to Habitat for Humanity, Red Cross, Meals on Wheels, United Way, and Ann Arbor Homeless Shelter

C. Pre-CMS Energy Experience (*see Summary below*)

Prior to joining CMS Energy, Mr. Hookham was involved as an executive in major engineering and construction company operations, with responsibilities extending into engineering, operations, program and project management, and profit and loss. He also served as principal engineer (responsible charge) on many projects overseeing multi-disciplined engineers, architects, surveyors, and designers and taking responsibility in all associated permitting activities with authorities having jurisdiction (AHJs).

HDR (Ann Arbor, MI) – 2008 to 2016 – Vice President – Supervised project managers executing large industrial, renewable energy, and utility/developer projects for TransCanada, Alliant Energy, DTE, others. Significant customer interfaces for work in Ontario, Alberta, Guatemala, Wisconsin, Iowa, Alaska, and Michigan, including expert witness services. Highlights included leadership and management roles on the first major wind generating projects in Michigan and Ohio, corporate risk analysis, project delivery, and customer relations. Results measured were annually measured against established budgets, negotiated schedules, customer satisfaction, and employee engagement. Led HDR's foray into design/build projects, securing a large power generating project in Ontario. Supported HDR's award-winning work on LEED and Envision certifications on customer projects in Iowa and Alaska, including a wind/pumped hydroelectric/gas package to support a proposed off-grid mining project.

Black & Veatch (Overland Park, KS and Ann Arbor, MI) – 1992 to 2008 – Project Manager and Vice President – Large industrial, utility and commercial project execution (including large lump-sum EPC delivery). Supervised EPC project managers with responsibilities for project delivery, customer satisfaction, and staff execution on global engineering and EPC assignments in Argentina, Brazil, China, Colombia, Saudi Arabia, and United Kingdom, and throughout the United States including multiple DTE projects.

Multiple Dynamics Corporation (Southfield, MI) – 1984 to 1992 – Project Manager/Executive on many industrial, commercial, residential construction/rehabilitation projects at steel making, cement, automotive assembly/fabrication, petrochemical, and chemical plants; systems engineer on Fermi II final design and commissioning. Grew a multi-disciplined staff to 20 professionals. Customers included architects, corporations, and institutions. Served as a construction consultant for many buildings on University of Michigan campus and technical consultant to national laboratories (ORNL, INEL) and U.S government (NRC, DOE).

Bechtel Power Corporation (Ann Arbor, MI and San Francisco, CA) – 1981 to 1984 – Structural Engineer and Assistant Project Manager on nuclear and fossil power generating projects in Michigan and California. Supported one of first tsunami analyses and worked on multiple seismic re-analysis projects as industry experience after Imperial Valley earthquake evolved. Also, supported multiple Mark 1 retrofit projects after Three Mile Island event.