The Chemical Consultant

Association of Consulting Chemists and Chemical Engineers, Inc.

Scientific, Engineering, Business & Management Consultants

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FUTURE MEETINGS

FEB 25, 2010

Snuffy's Restaurant
Scotch Plains, NJ

Dr. Michael M. Blumenthal,
Libra Technical Center LLC
Differential Scanning Calorimetry

APR 1, 2010

Snuffy's Restaurant
Scotch Plains, NJ
Bela Liptak, PE,
Liptak Associates
"The World's First 1,000 MW Solar-Hydrogen Demonstration Power

ABOUT THE ASSOCIATION

The Association of Consulting Chemists & Chemical Engineers (ACC&CE) is a network of senior-level consultants with a broad range of functional expertise and many years of experience in the chemical and allied industries.

The purposes of the organization are:

- To furnish support to its members as they conduct their consulting practices.
- To offer prospective clients a "clearing house" which they can use to find the most qualified consultants or team of consultants whatever their particular problem may be.

This newsletter is intended to support those purposes as well as to educate prospective new members and prospective client organizations about ACC&CE, and how we can be most helpful to them.

The ACC&CE has an interactive website – www.chemconsult.org, that allows prospective clients either to input their problem or to search for those consultants most skilled in their area of concern.

IN THIS ISSUE

In this issue, we have a number of articles expressing different views on the reality of climate change, the role of carbon dioxide, etc. I hope they will trigger more responses from others of our readers. One of these articles is from a non-member, with a very different idea of the cause of global warning. I must warn our readers that the article is so lengthy that I've only published Part 1, ending with a "cliff hanger". You'll have to wait for the first edition in 2010 to hear the rest of the story.

Also in this issue is the first part of an old piece on "The ACC&CE and the Need for Consultants in the Chemical Industry". This was retrieved and updated by Dan Kruh. This article is as timely today as it was when it was first written. Finally, there is a piece from our incoming President, Dr. Richard M. Goodman.

Keep reading and let us know what you think.

Joe Porcelli, Editor

Message from the President

The following is a message from Richard Goodman, who became President of ACC&CE at the October 2009 Annual Meeting.

At the beginning of a new decade it is appropriate to consider where an organization is and where it might be going into the future. ACC&CE is currently about 60 persons. As a group our average age is probably over 70 (A guess- I didn't calculate it) and our experiences would constitute more than a millennium of knowledge in chemistry and related fields. We still have a cadre of dedicated board members and almost half of our membership cast ballots in the last election. Our recent programs have been generally excellent with majority of the attendees applauding the speakers and topics as relevant and interesting. We have recently received a message from a member that a CHI brought him significant business and our treasury coffers will get a nice contribution from him as a result. As President I can also testify to getting inquiries through our website though not a real consulting contract as yet.

Nevertheless, going forward we do perceive a serious financial problem: our membership is small enough now that our dues do not cover our expenses. In short we must either find new members or other sources of revenue. Raising dues is unrealistic and costs are already at the minimum to sustain us as a viable organization. Do we seek merger with another group and if so which group? Is the current recession hurting our recruiting because companies are not hiring even consultants any more or are we fooling ourselves and, in fact, new consultants simply don't think ACC&CE would bring them any value? I will be attending the Spring 2010 ACS meeting as a Councilor from the New York Section. I will try to answer these questions during my stay at the meeting. If there are any other ACC&CE members planning to go to San Francisco let me know- let's get together out there.

If anyone has an idea to promote ACC&CE I will gladly listen to it and act upon the recommendation. I encourage all of our members and any would be members to tell me why they are members of ACC&CE. I would also ask any would be members to tell me why they are NOT members. Perhaps we can use the responses from both groups to guide our recruitment of new members..

Thank you for reading this message.

Richard M. Goodman

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CUSTOM MANUFACTURING
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of Fine Chemicals
Edward Richman, Ph.D.
768 N. Bethlehem Pike, L. Gwynedd, PA 19002
Ph: 215 628-2946 . email: richmanc@erols.com
Fax: 215 628-4262 . www.richmanchemical.com

Jasprit Singh, PhD

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Process Plants
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P.O. Box 541
Grand Island, NY
14072
(716) 773-4666
(Fax) 773-6420

SCHAUER ASSOCIATES

Dr. Richard L. Schauer
Regulatory Consultant

P.O. Box 398, 1211 Dexter Corner Road
Townsend, DE 19734
Phone: (732) 586-5678
Fax: (302) 449-6012
E-mail: rschauer@schauerassociates.com

J. Stephen Duerr, Ph.D., P.E., CPC
Consulting Metallurgist/Chemist
chemlabconsulting, LLC

514 Corrigan Way, Cary, NC 27519
908-500-9333 (FAX 815-301-8348)
chemlabconsulting@gmail.com

Experiences of our Member Consultants

David W. Riley, Extrusion Engineers, Certificate #591, contributed this article describing how consultants develop and grow.

Value through Vision

With a learning period of several decades, a potential consultant can develop a system that is peculiar to his abilities and hence, allows him to set up a practice that will support his needs and expand his horizons for the rest of his life. How he initiates and develops this set of abilities is personal and historic. The traits that the potential investigator needs will be explored in detail.

First, let us consider the advantages of technological development:

Computers were just being enhanced and applied to analytical equipment fifty-five years ago. I was hired first by DuPont in Wilmington Delaware and was allowed to explore the use of Infrared Spectroscopy to determine molecular structures. Branches were everywhere. At the same time light scattering molecular weights were being invented. We could then measure the Weight Average Molecular Weight and also the Number Average Molecular Weight using Osmometry. All of these techniques complemented each other, particularly for studying the relative changes in these factors and how they affected the Rheology of polymers. A number of DuPont scientists wrote some very profound papers in 1953 about the structure of polyethylene. This was before the invention of linear PE by using low temperatures and pressures.

To the Audience: When did your first opportunity arise?

The result of this series of studies developed medium density polyethylene that had the ability to give a tremendous “drawability” when extruded into sheets. This expansion was found to be 24 to 1 and suggested that a further investigation should be make in the laboratory. I used a melt indexer to extrude the sample and a Statham Strain Gage to measure the drawability on a small scale. I discovered that the DuPont standard polyethylene was much more unstable than Union Carbide’s material. This lead to a basic study that revealed that the DuPont material was made with too much initiating peroxide and needed a great deal more antioxidant to give better control of the aging of the polymer.

I took this knowledge on to Western Electric in 1960 and used those techniques to study Poly(vinyl chloride) [PVC]. In order to study PVC, I needed a laboratory and equipment. They set up a $150,000 laboratory including an Instron Capillary Rheometer, a Gas Chromatograph, a Beckmann Infrared Spectrophotometer, a Roll Mill, and a Melt Indexer.

Right away I justified the equipment. The plant was filled with fumes. Using the Gas Chromatograph, I determined that the fumes were DOP, the plasticizer from the PVC and not harmful at all. My lab had a recording temperature regulator. The plant had an electrical failure. The evidence from my recorder saved the plant one million dollars in insurance costs.

To the Audience: Is there any similarity with your experience?

I began to analyze the extruder equipment. The extruders were running too hot. This was because the flights of the screw were worn out. By correcting the design I made the extruders run 40°F cooled and the output went up some 20%. I then applied for a “Cost Reduction”, a program that Western Electric was famous for, and reduced costs by $400,000 per year in the year of 1965!!

Experiences of our Member Consultants (Cont'd)

David M. Riley, Cont'd.

As a result of my analysis of the equipment, I designed and had built a six inch extruder. This unit had to conform with the requirements that I had developed. It was close but not exact. I re-analyzed the data and found that the head design had to be changed marginally. After this was done, the machine worked like a charm, taking over 60% of the plant's $40,000,000 business. It worked perfectly for two years until I was re-assigned to other extruders; the new engineer could not believe that the machine was perfect, so he re-installed a device that I had discarded—and made it less than perfect!!

The insulation machines to which I was re-assigned were running at 3000 feet/minute with a 5 mil coating of the PVC. After studying these machines, I was appalled that the PVC was not burning up because the shear rate was in excess of one million reciprocal seconds, many orders of magnitude higher than in the screw flights (4,000,000 s^{-1} compared to 2000 s^{-1}). By being curious and exploring details, I observed that the PVC was plunged into cold water within 6 inches of the die. The time to go from the die to water was only 10 milli-seconds!! So the temperature that was higher by 100 degrees was controlled and the molecular structure maintained at a desired level.

The result of all this work was that I had the opportunity to develop new techniques and have them adopted by ASTM [American Society for Testing Materials]. This organization has now grown into a world –wide purveyor of Analytical Standards, recognized by everyone. Since I was hooked up with all these specialists, I absorbed the techniques and could not help but develop some of my own, namely D 3364, D 3591 and D 5575, all to do with molecular structure and rheology. My Vision has helped determine the means for defining gel particles and molecular structures that are helpful to everyone, constantly adding new Value to the meaning and usefulness of polymers around the world. I am now helping China, Malaysia, and the United Arab Emirates (next door to Saudi Arabia).

IN MEMORIUM

It is with sorrow that we announce that E. Bruce Nauman, professor and former chair of the Department of Chemical and Biological Engineering, and former director of industrial liaison at Rensselaer, died May 24, 2009. He held ACC&CE Certificate # 662.

Nauman joined Rensselaer in 1981 after a successful career in research and development with the Xerox Corporation and Union Carbide Corporation. A prolific researcher and scholar, Nauman published more than 150 journal papers and was author of five books, including his most well-known book, "Chemical Reactor Design, Optimization, and Scaleup." During his career he advised and graduated 32 doctoral students. He held six patents, related to his investigations into polymers, nanoparticles, and nanobiotechnology. Nauman was deeply committed to faculty advocacy and served for a time as chair of the faculty and president of the faculty senate.

Climate Change and its Impact on Industrial Production

Girish Malhotra, EPCOT International, Certificate #861 contributed the following article which deals with the differing positions of the developed and developing world on the remedies.

Climate change is a new challenge and a major discussion point between the developed and the developing countries. Some sort of emission limits will be placed as we move forward. There is lot of posturing and both sides are making point and counterpoint.

Developed countries did not have emission restrictions during their growth. With the current demand to curb emissions, some curbs will be negotiated. Developed and developing countries are afraid of the curtailment of their industrial machine. In order to retain their industrial complex developed countries will exert pressure. However, the developing countries especially India and China are not going to readily agree to any curbs. In Secretary Clinton's recent trip India Rejected U.S. Proposal of Carbon Limits [Hyperlink: http://online.wsj.com/article/SB124789530843561651.html#mod=djemITP]

A recent article India and Climate Change [Hyperlink: http://online.wsj.com/article/SB124787011359360457.html] takes India as example and excludes China, though both present similar challenges for the developed countries.

This article states "If (the) developed nations are held responsible for emissions that they historically contributed, oblivious to their impact on climate change, why shouldn't (the) developing nations take responsibility for producing generations of people who will generate emissions into the future?" Is it an indirect admission that the developed countries are afraid of the curbing their economic growth and are afraid of the growth of the developing countries? It seems to suggest that since the developed countries control their population, they can keep emitting at the current per capita rate. Is it also suggesting that the living standards of the developed countries should stay high and of the developing countries should not? If this is the latent intent, it is not going to sit well with the developing countries.

Are we saying "Maslow's hierarchy of needs" only applicable to the developed countries? Developed countries have had the developing countries as their market, but now they challenging us on our turf, we are not willing to accept the challenge. The game has changed and we will have to play with the new rules. Their development and negotiation is going to be a challenge.

Recently International Council of Chemical Associations [http://www.icca-chem.org/] engaged McKinsey & Co. to suggest steps the chemical industry needs to take to curb emissions and still innovate. This study excludes chemicals that improve the living standards (including pharmaceuticals) and assumes gross savings from such chemicals to be zero.

I have concerns about this exclusion as we are excluding an important segment (pharmaceuticals about $800 billion revenue out of $3 trillion dollars per year) that has a large carbon imprint. Pharmaceuticals (API and formulated products) present an opportunity to reduce their imprint. There is an opportunity to improve their manufacturing

Climate Change and its Impact on Industrial Production (Cont'd)

Malhotra, Cont'd.

inefficiencies (low yield) and reduce their solvent use, thereby achieving an offsetting positive impact. Technology improvement will also reduce healthcare costs. An effort is needed in earnest.

Development and global sharing of the low carbon emission technologies might be the answer. Another option for the companies in developed countries is to move their factories to developing countries. Thus they would not have to implement tougher emission standards. This is not a viable option.

In the past 15-20 years countries have become dependent on each other. What was environmentally acceptable yesterday will not be acceptable tomorrow. Since the global warming will affect us all, we will have to compromise and live with the new rules whatever they might be.

A Contribution from the Past

The following article was presented on August 21, 1984, to a meeting of the AIChE in Philadelphia. It was written by former ACC&CE members Lewis B. Weisfeld (# 575) and Harry J. Prebluda (# 539). Parts of the article or the ideas presented were used in 1999 by an Internet service in the UK (chemweb.com, courtesy of an editor, Brian Rothery) as online publicity associated with ACC&CE's 70th anniversary. Certain portions have been updated.

"The ACC&CE and the Need for Consultants in the Chemical Industry"

No other field of science relates itself to more areas of knowledge than chemistry. The chemical industry has been undergoing such rapid technological change that it is quite common for large and small progressive companies to use consultants to remain profitable. Consultants these days are a way of life not only in technology but also in politics and business. Experienced company executives know that whenever they have difficult problems of a technological nature, somewhere out there a consultant is available who can resolve the problem better and faster than any person within the structure of the company organization.

Research directors and those responsible for sales and marketing programs are telling their management to bring in outsiders to cross-pollinate the company with new ideas for new products and also help lower production costs. Professionals in the chemical business are among the first to recognize that they are often too close to their work inside the company to have proper touch and perspective for improving the final cost of the manufactured product to withstand the rigors of competition so that it performs better. As a rule, consultants have broad background experience with much historical confidential interfacing on situations not usually available to the client company. In today's fast moving world, consultants are just as important for the progress of small companies as large ones.

In earlier decades, chemical companies depended on their purchasing departments to glean information about their competition from supplier contacts. In more recent years the myriad of technical publications and the web have helped management monitor what has been going on.

A Contribution from the Past (Cont'd)

Rising costs and decreasing budgets have forced many companies to curtail their research and marketing staffs. They have found it more economical to use qualified consultants until their budgets can justify hiring additional full-time professionals. A consultant also has attributes which help supplement staff efforts. Even in times of ample budget, many companies find it profitable to take on consultants to address high-risk, high payout new business development projects at the lower end of program priorities. Should the project prove negative (as high-risk projects sometimes do), there is no need to redeploy or lay off specially skilled personnel since none need to be hired in the first place. But should the project succeed, the consultant can aid in staffing for the new business.

The importance of the external viewpoint cannot be overstressed. With greater public participation in the financing of new technical business ventures, there is a greater trend to have reputable consultants called in to improve the financial credibility of young organizations. This is now a practice when banks or financial institutions consider the merits of processes or products. Potential investors feel more comfortable for assurance of a return on investment when an accredited outside group passes judgment and can validate general plans for launching a new project.

WHY ACC&CE?

Most consulting chemists and engineers become consultants only after several decades of invaluable industrial experience in a structured corporate environment. Seeking to capitalize on their entrepreneurial spirit and experience, perhaps even maintaining retention contracts with former employers, they find themselves suddenly alone (at least initially) in an isolated office with their computers. The loss of corporate identity often accompanies a person's decision to start their own business and we sometimes don't appreciate the stimulation and cross-fertilization that has occurred daily in a large corporate environment until it is gone.
One must also keep abreast of one's art. Continued association with scientific and technical societies, active participation in the voluntary consensus standard organizations and, of course, updating via technical and trade publications and online sources are essential. But there is more. Association with one's consultant peers is necessary. Thus, there should be a forum for discussion of mutual problems, for generation of new ideas on the marketing of skills, for referrals and cross-referrals and, not in the least, for the stimulation that was once the province of the corporate structure.

The Association of Consulting Chemists & Chemical Engineers, Inc. (ACC&CE) provides such a forum. Of venerable lineage, it was organized sometime prior to 1928 when a group of distinguished chemists including Drs. Jerome Alexander, Lewis P. Hammett, and A. G. Stillwell felt the need for a professional organization in which chemical and engineering consultants should "conform to the highest principles of professional conduct". This group formed an association "to advance the practice of consulting chemists and chemical engineers". It took several months of careful study and preparation by the organizing committee headed by Clarence V. Eckroth before some 29 chemical consultants met on March 2, 1928, at The Chemists' Club in New York City, at which time they adopted a constitution, code of ethics and bylaws. The newly formed group called itself "The Association of Consulting Chemists & Chemical Engineers, Inc." It was headquartered at The Chemists' Club for many years and since has been operating from Sparta, NJ for more than a decade.

To Be Continued in 2010

A Technology Driven Paradigm

This article was contributed by John C. Bonacci, PhD, PE, US Patent Agent, Fibonacci Inc., Certificate #821

The **situation** is that we don't have a major jobs and economy paradigm easily understood like the past move from i) agriculture to ii) manufacturing to iii) service/finance. Some may think that technology has always been driving in the past few decades but I believe a difference needs to be understood so that progressing forward is possible. For example government funding and support of science has declined in the past 8 to 12 years.

First, lets define some technology areas to frame our thesis:

Electronics, which includes broad based usage as well as miniature hardware products
Energy production and transmission
Manufacturing processes (excluding energy)
Medical applications
Financial management
etc.

Second, we should recognize that in the USA; a) low labor cost has always been a big factor in siting plants; b) plants new and expanded relocate because they need more space; c) plants gravitate to low taxing areas; d) plants are located where the environmental needs are lowest. Our major corporations and plant design books know these criteria quite well. They were first applied in the USA by moves to the West, then to the South and now Overseas.

We need to address the above list now to find ways to minimize the overseas driving forces with new technologies not even dreamed of but also with innovative laws and regulation.

One aspect is the technology consensus, that currently and recently – "the USA has been driven by electronic advances re devices and computers-". However, at the moment, much new technology moves just as fast to places outside the country and very few new jobs or businesses are created that will grow within the USA. The reason is that a new inventor can hire an accountant and an attorney and outsource everything else, i.e. become a virtual company. This consensus covers the aspects of miniature products like I-phones, cell phones, PC's, etc. and is the same for large or small companies.

Another aspect involves process technology like electrochemistry, batteries, existing plant modernizations, etc. But this aspect especially needs help from (you guessed it), the government.

A third aspect lies within "Infrastructure". It is not just the correction of old roads, bridges and buildings, it is the need to change these and improve them with the latest and newest technology. To be first with a powerful infrastructure as in the past is no longer sufficient to carry the USA; we must be the best.

A Technology Driven Paradigm (Cont'd)

Bonacci (Cont'd)

The **solution** lies within two words that are often considered a dreaded approach, i.e. an "Industrial Policy" for the USA. An Industrial Policy does not necessarily make the USA a Socialistic or a Communist country. It can just mean that we should do formally some of the things we did by evolution in a "step by step" methodology for many years. Just because the Soviet Union didn't do 5-year planning to a successful long-term conclusion does not mean that American ingenuity will be as careless. Do you recall anti-trust legislation, regulated banking, helpful environmental laws, import duties, tax regulations? It's all a matter of degree, not kind.

So how does the USA get started with an "Industrial Policy"?

Advertise the idea and just say we will do it by establishing study groups within our existing framework and structures such as Chambers of Commerce, International Corporations, Business bureaus, groups like Common Cause, various Think Tanks.
Wake up Congress by letters, calls, and e-mails until they get the numerous Committees involved.
Get the remaining Unions in the USA involved.
Get immigrant groups involved.
Pay all U.S. citizens for patents that make it through the U.S. Patent Office.

My expectations are:

We will need import tariffs to establish a level playing field
We will need a change in some of our patent laws
We will need to tax overseas profits more
We will need to give tax breaks to USA manufacturing businesses
We will get a loud yelling and screaming from certain international corporations who now make their money overseas and their ideological backers
We will get opposition from both liberals and conservatives and neither will make sense.

In the end, we need to create a level playing field in the USA for business and jobs. I remind you that we did not have a level playing field in the first 150 to 200 American years; we had a field that was greatly to our advantage over the rest of the world because of resources and geography, newness and freedom. We have less of the initial factors but we still have freedom, the main driving force to progress.

As experienced and accomplished professionals, we must speak out for technology enhancement by our government so we can define and move on to a unique 21st century paradigm.


Poly(Chem-Tech)
CHEMICAL CONSULTING
Industrial
Consumer Product
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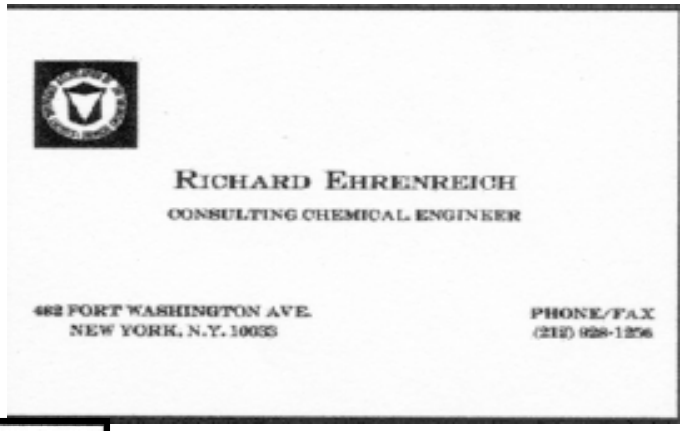
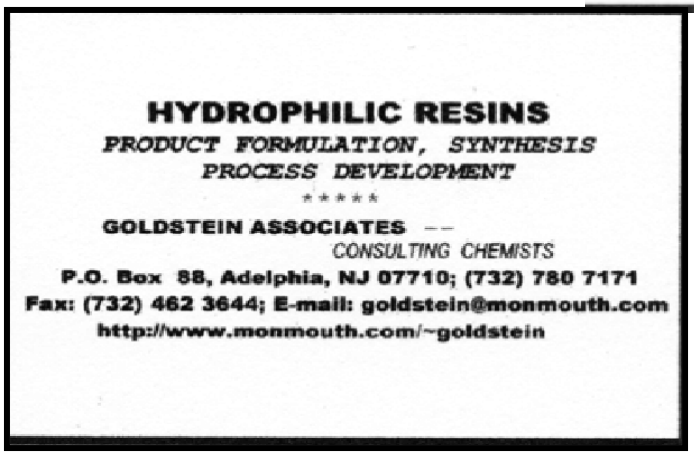
Dental Products
Polymers
DANIEL KRUH, Ph.D
President
8 Braddock Street
East Brunswick, NJ 08816
Voice/Fax: (732) 238-3182
Email: DanKruh@aol.com


RICHARD EHRENREICH
CONSULTING CHEMICAL ENGINEER
482 FORT WASHINGTON AVE.
NEW YORK, N.Y. 10033
PHONE/FAX
(212) 928-1256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GOLDSTEIN ASSOCIATES --
CONSULTING CHEMISTS
P.O. Box 88, Adelphia, NJ 07710; (732) 780 7171
Fax: (732) 462 3644; E-mail: goldstein@monmouth.com
http://www.monmouth.com/~goldstein

Let's Revisit the Science behind Carbon Dioxide Control—Part 1

This article is contributed by a guest, Gerry McDonald. Mr. McDonald is a retired petrochemical engineer with 50 years' experience in energy management. He can be contacted at GerryMcDonald@Comcast.net. **Because of its length, I have cut it into two parts, and the following is Part 1. Part 2 will appear in our next Newsletter**

Part 1

Global warming is real. Retreating glaciers, shrinking ice caps and the melting Arctic Ocean provide undeniable visible proof. But the phenomenon is poorly understood and politicians and scientists have rushed to questionable conclusions.

It is widely, but erroneously, believed that the "Greenhouse Effect," is caused by the increasing amount of carbon dioxide in the atmosphere, and that Global Warming can be reduced by removing CO_2. **That belief is wrong, and its pursuit of "carbon reduction" is a serious waste of financial and political resources.**

The History of the Greenhouse Effect.

In the late 19th century when knowledge of infrared spectroscopy was rudimentary, Prof. Savante Arrhenius of Uppsala University proposed the Greenhouse Hypothesis: *Solar radiation reflected from the earth is captured by atmospheric* CO_2 *and reflected back to the earth causing progressive global warming.* However, in 1900 Knut Angstrom, Arrhenius's junior at Uppsala and an expert on solar radiation, published definitive data on the absorption of infrared radiation by CO_2 that questioned Arrhenius's hypothesis. Arrhenius responded strongly, dismissing Angstrom's work, even publishing a rebuttal in *Annalen der Physik.* There the matter lay till the International Geophysical Year (1958) revived interest in climate change and Arrhenius's work, was unearthed, but Angstrom's was overlooked. The scientific basis for the Greenhouse Hypothesis is questionable.

Conflicts with Current Data

The Greenhouse Effect is based on the hypothesis that short wave (> 1 micron) solar radiation is re-radiated at a longer wavelength (10 micron), which in absorbed by atmospheric CO2 then re-radiated back to the earth causing Global Warming.

The most authoritative discussion of the Greenhouse Hypothesis is a paper[2] by The National Center for Atmospheric Research (NCAR) which illustrates how short wave (> 1 micron) solar radiation is then re-radiated at a longer wavelength to be absorbed by atmospheric CO_2 and again re-radiated back to the earth. But, according to Wein's Law the earth radiates at 10 micron and the closest CO_2 infrared absorption bands are at 15 micron and 4.26 micron[2] It appears unlikely that a much of the earth's to-micron radiation is captured and re-radiated.

If the Greenhouse Effect is real the re-radiated infra red from the atmospheric " CO_2 blanket"

Let's Revisit the Science behind Carbon Dioxide Control—Part 1 (Cont'd)

McDonald (Cont'd)

should augment the performance of solar cells on the earth's surface. The accepted value of the zenith solar flux is 1367 W/sq.m in outer space and about **930** W/sq.m. at sea level, after atmospheric absorption. Let's do some reverse engineering? A leading solar panel vendor offers a 1.4 sq.m solar panel, which is warranted to generate 180W. Now 180/1.4 = 128 W/sq.m. Those solar cells are rated at 13.2% efficiency. So the incident radiation assumed for design was 128/0.132 = **970** W/sq.m. Essentially no credit was taken for the global mean greenhouse hypothesis back radiation predicted, by NCAR to be 324 W/sq.m. Notably, ASTM test method E1036 for solar cell performance evaluation also assumes an irradiance of 1000W/sq.m - ignoring the greenhouse radiation. **Why are we spending billions to reduce CO_2 emissions when the Greenhouse Hypothesis has negligible practical significance?**

It is claimed that the apparent correlation between the increased atmospheric CO_2 and the increased global warming demonstrates cause and effect. That is not the case. These are both independent effects of Thermal Pollution and would therefore be expected to correlate. The baseball season begins in the spring and birds nest in the spring but it can hardly be argued that birds nest because the baseball season starts.

Much of the support for the Greenhouse Effect is based on sophisticated mathematical weather models that have not been very accurate in predicting weather one month, let alone one century, ahead. Eminent experts such as (Nigel Thomas: ("An Appeal to Reason"), Gabrielle Walker and Sir David King: ("The Hot Topic"), Bjorn Lomborg: ("The Skeptical Environmentalist") and others have noted "flawed arguments" and the need to "tweak" the data so that these data produce the desired results. Mathematical models, that have to be "tweaked", are highly suspect. One author talks of "computerized storytelling".

Greenhouse Effect proponents make doomsday predictions of climate change, based on their estimates of the effect of doubling the concentration of atmospheric CO_2. This overlooks the fact that both the NCAR study, and Arrhenius's original work, state that the Greenhouse Effect, if it exists at all, is logarithmic not linear and will have a progressively smaller warming effect.

The Role of Humidity

Our natural senses give clear evidence of the greenhouse effect due to water vapor, more familiarly known as humidity. After a hot day we can enjoy a cool clear night with brilliant stars when the absence of water vapor in the dry air permits the earth to radiate heat back into space. Daytime in tropical deserts with blistering temperatures is often followed by chilly, even cold, nights when the dry air permits radiation of heat back into space. Nature does not provide similar evidence of greenhouse effect due to CO_2.

The NCAR study states that, in a clear sky, water vapor causes 66%~85% of the observed greenhouse effect and the American Meteorological Society concurs: "water vapor is the most important greenhouse gas accounting for 60% of the total. The concentration of water in the atmosphere is 40 times that of CO_2. **Are we barking up the wrong tree? If Global Warming is not caused by the Greenhouse Effect what is the real cause? END OF PART 1**

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The Association of Consulting Chemists
& Chemical Engineers
P.O. Box 297
Sparta, NJ 07871
Phone: 973-729-6671
FAX: 973-729-7088
accce@chemconsult.org
www.chemconsult.org
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