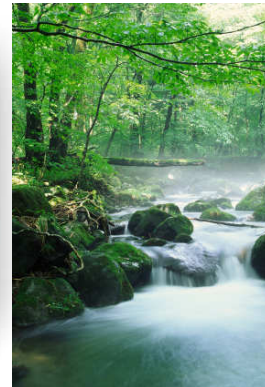


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THE UNIVERSITY OF TEXAS AT AUSTIN

Presents

CleanTX Analysis on Environmental Regulations



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Special Thanks to:



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I. Executive Summary

The cleantech industry has the potential to be a major economic driver for the United States and is already one of the largest venture capital investment categories. However, the development of cleantech must be cultivated carefully and public policy must be accompanied by environmental regulations.

The term “environmental regulation” describes the many statutes written by Congress and state legislatures that deal with protecting the environment and the public health. Environmental statutes cover a wide range of subjects, but most of those statutes need regulatory agencies to implement them. Although a statute provides the basis for legal protection, regulations that implement that statute must be transmitted by regulatory agencies that are given duties under a particular statute.

Developers of cleantech products and services often need to be in compliance with environmental regulations agencies, which set specific performance standards and permitting requirements. The growing clean energy economy is also being driven by regional, federal, and international standards. Many states have passed laws mandating or encouraging clean energy technology development and others are expected to enact regulations to response to greenhouse gas emissions. The impact of such environmental regulations will not only impact the development of the cleantech industry, but will also influence will impact human health, commercialization, energy, and environmental issues.

II. Regulatory Agencies

Federal regulatory agencies derive their authority from statutes passed by the federal legislature. Each state legislature then passes statutes either analogous to the federal system or more stringent than the federal regulations. If the state regulations meet or exceed federal standards, the federal agency may then delegate regulatory authority to the state agency.

A. Environmental Protection Agency (EPA)

The EPA is the U.S. federal agency that regulates pollutants and protects human health by safeguarding air, water, and land¹. The EPA has the primary responsibility for setting and enforcing national standards under a variety of environmental laws. In addition to regulating pollutants, the EPA distributes grants to state environmental agencies and non-profits, conducts environmental research, disseminates relevant information to the public, and sponsors partnerships to address environmental concerns.



B. Texas Commission on Environmental Quality (TCEQ)

The EPA has delegated regulatory authority for most environmental programs in Texas to the Texas Commission on Environmental Quality. The TCEQ is responsible for protection of Texas's natural resources, including air, water and land, through a range of regulatory activities.²

The TCEQ provides permits for activities associated with traditional energy production, such as mineral extraction and petroleum storage, as well as permits required for clean energy production.



¹ See U.S. EPA's website, <<http://www.epa.gov/>>.

² See Texas Commission on Environmental Quality's website, <<http://www.tceq.state.tx.us>>.

III. Federal Regulation

A. Clean Air Act

The Clean Air Act is the law that defines EPA's responsibilities for protecting and improving the nation's air quality and the ozone layer through a reduction of smog and air pollution. The Clean Air Act has been in existence since the Air Pollution Control Act of 1955, followed by the Clean Air Act of 1963, the Air Quality Act of 1967, the Clean Air Extension Act of 1970, and the Clean Air Act Amendments in 1977 and 1990³.

B. Clean Water Act

The Clean Water Act (CWA) protects surface water quality in the United States. The Act does not deal directly with ground water or with water quantity issues. The statute protects water quality by regulating pollutant discharges into waterways and on land, as well as managing stormwater runoff⁴.

C. Resource Conservation Recovery Act (RCRA)

The Resource Conservation Recovery Act (RCRA) was enacted in 1976 and governs the disposal of solid and hazardous waste⁵. RCRA regulations cover:

- Protection of human health and the environment;
- Conservation of energy and natural resources;
- Reduction of waste generated; and
- Management of wastes in an environmentally-sound manner.

D. Toxic Substances Control Act (TSCA)

The Toxic Substances Control Act (TSCA) provides the EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures⁶. The TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon, and lead-based paint.

Note: Pertinent to materials-based cleantech development is the TSCA's New Chemicals Program, which manages the potential risk from chemicals new to market. The New Chemicals Program functions as a "gatekeeper" that can identify conditions, up to and including a ban on production, to be placed on the use of a new chemical before it is entered into commerce. Anyone who plans to manufacture or import a new chemical for a non-exempt commercial purpose is required by section 5 of TSCA to provide EPA with notice before initiating the activity. This pre-manufacture notice (PMN) must be submitted at least 90 days prior to the manufacture or import of the chemical.

³ See Summary of the Clean Air Act, <<http://www.epa.gov/regulations/laws/caa.html>>.

⁴ See <<http://www.epa.gov/regulations/laws/cwa.html>>.

⁵ See <<http://www.epa.gov/regulations/laws/rcra.html>>.

⁶ See <<http://www.epa.gov/regulations/laws/tsca.html>>.

IV. State Regulation / Texas Permits

TCEQ offers a variety of information available on their webpage as well as contact numbers for the appropriate permitting divisions. The types of permits applicable to some businesses are laid out in the “Permits and Licenses You May Need” site.⁷ If you are a small business, you may also receive *free* permitting assistance from the TCEQ’s Small Business Administration hotline.⁸

A. Air Quality

If you are constructing or modifying a facility that may emit air contaminants, depending on the level of emissions you may need to apply for one or more of the following authorizations from the TCEQ⁹:

De Minimis:

If your facility emits minimal emissions and meets the conditions of Title 30 of the Texas Administrative Code (30 TAC) Section 116.119(a), you will be considered a “de minimis” facility. De minimis facilities do not require a permit to construct or modify, but sufficient records should be kept on-site proving that site-wide emissions meet the “de minimis” requirements.”¹⁰ Some examples of “de minimis” facilities include:

- Equipment used for hydrostatic or hydraulic testing
- Heating and cooling equipment
- Offices
- Water Treatment System Maintenance
- Conditional Facilities [includes painting, blasting, storage tanks, for example]¹¹

Permit by Rule:

If site-wide emissions exceed “de minimis” levels, but are still relatively minor, your facility may qualify for a Permit by Rule (PBR) authorization. PBR authorizations require minimal paperwork, are relatively quick to receive authorization, and do not require approval to begin construction or modification of the facility. To qualify for PBR authorization, your facility must emit less than: 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_x); or less than 25 tpy of total particulate matter (PM₁₀), sulfur dioxide (SO₂), total volatile organic

⁷ See http://www.tceq.state.tx.us/nav/permits/business_types/index.html.

⁸ TCEQ Small Business Administration hotline 1-800-447-2827. See also <http://www.tceq.state.tx.us/assistance/sblga/sblga.html>.

⁹ Texas has been delegated authority from the Environmental Protection Agency (EPA) to issues its own air quality permits.

¹⁰ Texas Health & Safety Code Section 382.016, Monitoring Requirements and Examination of Records.

¹¹ A full list of unconditional and conditional “de minimis” facilities is available on the TCEQ website, at http://www.tceq.state.tx.us/files/demlist08.pdf_4296960.pdf.

compounds (VOC); or less than 25 tpy of any other air contaminant.¹² TCEQ offers a list of PBRs that can be claimed in Chapter 106, such as¹³:

- 106.122: Bench Scale Laboratory Equipment
- 106.124: Pilot Plants
- 106.183: Boilers, Heaters, and Other Combustion Devices
- 106.225: Semiconductor Manufacturing
- 106.261 or 106.262: Facilities (general or default PBR)
- 106.532: Water or wastewater treatment

Standard Permit:

In addition to the PBRs, Standard Permits provide another permitting option for minor emissions. Standard Permit authorizations require registration and public notice, but remain a more expedited and less onerous administrative process than an individual New Source Review permit.

Standard permits are available for pollution control projects, animal carcass incinerators, boilers, sawmills, oil and gas facilities, municipal solid waste landfills, concrete batch plants (and plants with enhanced controls), electric generating units, rock crushers (permanent and temporary), and hot mix asphalt plants.¹⁴ In addition to meeting specific requirements for each standard permit, the operation must also meet other federal standards that are pollutant and/or industry-specific.

Note: Additional emission limits may be required depending on the location of the facility. If the plant is located in the Dallas-Fort Worth or Houston-Galveston-Brazoria metroplex there will be more stringent controls on the emission of ozone precursors due to the reduced air quality of those regions.¹⁵

State New Source Review:

If your operation exceeds “de minimis” or PBR limits and does not meet the requirements of a Standard Permit, you may need to undergo a case-by-case analysis for an individual state permit, or New Source Review (NSR) permit.¹⁶ The NSR permitting process may take anywhere from 6 months to several years depending on whether it is protested. Typically, the permit will undergo administrative review, a public notice period (newspaper publishing and sign posting), and technical review before issuance. If anyone requests an administrative hearing, however, your facility must undergo a second notice period, further extending the permit review timeline. Until the permit has been issued, no construction or modification is allowed.

¹² See 30 TAC Chapter 106, Permits by Rule.

¹³ *Id.* Also see a full list of all PBRs is available on the TCEQ website, at <http://www.tceq.state.tx.us/permitting/air/permitbyrule/pbr_index.html>.

¹⁴ See 30 TAC Chapter 116, Subchapter F. Standard Permit information also available on TCEQ’s website, at <<http://www.tceq.state.tx.us/permitting/air/nav/standard.html>>.

¹⁵ See 30 TAC Chapter 117, Control of Air Pollution from Nitrogen Compounds.

¹⁶ See 30 TAC Chapter 116, Subchapter B.

Since obtaining an individual NSR permit is a more technically detailed and time-intensive process, it is more common for a smaller operation to qualify and register for PBR authorization or a Standard Permit.

Federal Title V Permit:

Most start-up companies will begin on a smaller scale and will not be considered a “major source” of air emissions. If, however, the facility either increases the size of its operations or begins as a large operation which creates a significant amount of emissions, then the facility will be considered a “major source”.¹⁷ Every major source must undergo federal Title V permitting and depending on which Texas region the facility is located in, either a Prevention of Significant Deterioration (PSD) or Nonattainment NSR permit will be required.¹⁸ Typically, a Title V permit will also accompany an NSR permit and will undergo concurrent permitting timeframes.

B. Water Quality

If your facility will discharge a pollutant into surface water, you will have to obtain a water quality permit as well. TCEQ has authority to handle water quality regulations and issue any permits for stormwater runoff or treated wastewater discharges that have the potential to affect Texas surface waters.

Stormwater Permits:

Operations that affect one or more acres and are exposed to rainfall require a general water quality permit, or stormwater permit. Typically, you will need to apply for either a Construction Stormwater Permit¹⁹ or Industrial Stormwater Multi-Sector General Permit.²⁰ Some stormwater permits are tailored to specific operations, such as aquaculture facilities, concrete batch plants, hydrostatic tests, petroleum fuel, and concentrated animal feeding operations to name a few.²¹

¹⁷ See 40 CFR §52.41(23)(i) for threshold limits for “significant” emissions. Significance thresholds include: 100 tpy for CO; 40 tpy for NO_x, SO₂, or VOCs; 25 tpy for particulate matter (PM); 15 tpy for PM₁₀ (particles less than 10 microns in diameter); 10 tpy for PM_{2.5} and hydrogen sulfide; 0.6 tpy for lead; 3 tpy for fluorides; and 7 tpy for sulfuric mist.

¹⁸ The Dallas Fort Worth and Houston-Galveston-Brazoria regions are designated as nonattainment for ozone precursor pollutants. Nonattainment areas are those which are not currently meeting federal air quality standards (National Ambient Air Quality Standards) for specified criteria pollutants; since these areas are not meeting federal air quality standards, there are more stringent controls on major source emissions.

¹⁹ See page 3 of the TCEQ Construction Stormwater Permit for applicability, available at: <<http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/trx150000.pdf>> .

²⁰ See page 9-16 of the TCEQ Industrial Stormwater Permit for applicability, available at: <<http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/trx050000.pdf>>.

²¹ A complete list of stormwater permits is available at <http://www.tceq.state.tx.us/permitting/water_quality/wastewater/general/index.html>.

Note: Stormwater permits are not mutually exclusive and in some circumstances, both a construction and industrial stormwater permit will be required for adequate coverage of the site's operations.

Water Purification & Treatment:

Multiple permits are required for the construction and operation of a water purification and treatment plant. If your facility is a public water supply system²², you will be required to obtain approval for your plans, an engineering report, and submit forms prior to construction of the project. The treatment plant must meet Texas water quality standards in: 30 TAC Chapter 290, Subchapter D and F, as well as Chapters 291, 293, and 325.²³

Note: In addition to TCEQ water quality standards, public water systems must also meet Texas Department of State Health Services' regulations.

Wastewater Treatment Permits:

If your facility has a wastewater treatment plant on-site, you may dispose of your treated effluent either in state water or dispose of the treated wastewater on land (irrigation), underground (subsurface disposal), or by evaporation (evaporation ponds). Texas Pollutant Disposal Elimination System (TPDES) permits cover direct discharges and Texas Land Application Permits (TLAP) cover all other discharges that do not directly affect surface water. The permitting timeframes for TPDES or TLAP permits are similar to the air quality permits, in that a protested permit may take several years to undergo administrative review. The remnant sewage sludge from wastewater treatment also requires a separate TCEQ authorization.²⁴

Note: TCEQ's authority on water quality does not cover discharges associated with oil, gas, and geothermal exploration activities. These water quality concerns are addressed by a separate agency, the Railroad Commission of Texas.

Water Pollution Abatement Plan (Edwards Aquifer Recharge Zone):

Due to the sensitive nature of the Edwards Aquifer Recharge and Contributing Zones, any operations that have the potential to discharge contaminants and affect water quality of the aquifer will additionally require a Water Pollution Abatement Plan (WPAP).²⁵ The permit authorization is handled through the TCEQ Regional Office, rather than TCEQ Headquarters.²⁶ To determine if your operation is located over the Edwards Aquifer region and will require a

²² If water service is provided to 25 or more people, your facility may qualify as a public water system. See <http://www.tceq.state.tx.us/permitting/water_supply/pdw/pdw_amiregulated.html>

²³ See TCEQ Guidance Document RG-346, available at <http://www.tceq.state.tx.us/files/rg-346.pdf> 4301365.pdf.

²⁴ See "Tips for Completing Water Quality Permit Applications", available at <http://www.tceq.state.tx.us/permitting/water_quality/review/tips.html>.

²⁵ See 30 TAC Chapter 213.

²⁶ TCEQ Regional Offices available at: <http://www.tceq.state.tx.us/files/GI-002_11-05-08.pdf_4419544.pdf>.

WPAP, visit the TCEQ's Edwards Aquifer Map Viewer.²⁷ If applicable, your facility will need to apply for a permit, undergo administrative and technical review, as well as a public notice period where the public may request a hearing. The application process can vary from six months to several years again depending on whether the permit is protested.

Wetlands: U.S. Army Corps of Engineers 404 and 401 permits:

During construction of your facility, if you disturb less than 3 acres of wetlands or water habitat, you may apply for a Tier I Certification with the U.S. Army Corps of Engineers (USACE).²⁸ Alternatively, if your construction project falls under a specific listed category and is minor in scale, you may request TCEQ authorization under a Nationwide Permit.²⁹ For larger projects affecting greater than 3 acres of waters, you will have to publish notice of your project as well as to receive USACE and TCEQ review and approval prior to construction.³⁰

C. Waste

It is likely that a manufacturing or production operation will produce some type of waste, which the manufacture, transport, and disposal of requires TCEQ authorization. Regulations controlling waste vary according to the type of waste produced or handled.³¹ Solid wastes are classified into the following groups: hazardous, industrial, municipal solid, and universal waste. Universal wastes include batteries, pesticides, mercury-containing equipment, and bulbs. Municipal solid waste includes all other solid waste other than industrial, and industrial solid waste includes waste from industrial, agricultural, mining, or manufacturing.³² Hazardous waste is defined by the EPA and is either specifically listed by the EPA as a hazardous waste or contains one or more characteristics of hazardous waste: ignitability, reactivity, corrosivity, and toxicity.³³

Once you determine the type of waste you are generating, the next step is to determine whether you are exempt from TCEQ permitting.

²⁷ TCEQ Edwards Aquifer Map Viewer available at:

<http://www.tceq.state.tx.us/compliance/field_ops/eapp/viewer.html>.

²⁸ TCEQ authorization is not required for a Tier I project. See TCEQ 401 Projects at

<http://www.tceq.state.tx.us/permitting/water_quality/wq_assessment/401certification/401certification_tier1.html>.

²⁹ See TCEQ website on Nationwide Permits, at

<http://www.tceq.state.tx.us/permitting/water_quality/wq_assessment/401certification/401certification_nationwide.html>.

³⁰ See TCEQ Tier II Certification Questionnaire and Alternatives Analysis Checklist, at

<<http://www.tceq.state.tx.us/assets/public/permitting/waterquality/forms/20229.pdf>>.

³¹ See TCEQ Publication RG-022, *Guidelines for the Classification and Coding of Industrial and Hazardous Wastes*, available at <http://www.tceq.state.tx.us/files/rg-022.pdf_4443238.pdf>.

³² See 30 TAC §335.1, Definitions.

³³ See 40 C.F.R. 261, Subpart C.

Note: Even if you meet the exemption requirements you must still comply with 30 TAC Chapter 335, such as registration and notification requirements.

Examples of exempt facilities include:

- Conditionally exempt small quantity generators (30 TAC §335.2)
- Certain recycling operations (30 TAC §335.24)³⁴
- 90-day storage or less (30 TAC §335.69(a)(1))
- On-site disposal of non-hazardous industrial solid waste (30 TAC §335.2(d)(1), (2))
- Wastewater treatment units (30 TAC §335.41(d))

If your facility does not meet the exemption categories and requires a permit, you should expect a permitting timeframe of one to several years depending on whether the permit is protested. The permit will require an administrative review, technical review, public meeting, and public notice and comment period for new facilities.

D. Other

Aboveground and Underground Storage Tanks

If you plan on having storage tanks above ground that hold petroleum products³⁵, you will need to register each tank over 1,100 gallons with the TCEQ whether empty or used. If any tank greater than 500 gallons is located over the Edwards Aquifer recharge or transition zone, you will need to also file an Aboveground Storage Tank Facility Plan.³⁶

Any underground storage tanks must be registered with the TCEQ (whether empty or full), have a proof of financial assurance associated with it, and any changes to the tank must be submitted to the TCEQ within 30 days of the proposed change.³⁷ The certificate, once approved, must be renewed on an annual basis.

Note: Effective September 1, 2007, Petroleum Storage Tank owners no longer are required to submit annual registration fees.

Endangered Species Act:

In the event that your facility impacts endangered species' habitat, you must consult and receive authorization to proceed from the U.S. Fish and Wildlife. Terrestrial and aquatic endangered species are regulated by the U.S. Fish and Wildlife Services as well as the Texas Parks and

³⁴ See TCEQ Guidance Document No. RG-240, *Can I Recycle Some of My Industrial or Hazardous Wastes*, available at http://www.tceq.state.tx.us/files/rg-240.pdf_4443350.pdf.

³⁵ Petroleum products are considered to be petroleum substances that can be used as a motor fuel. See 30 TAC §334.2(79).

³⁶ See TCEQ Aboveground Storage Tank Facility Plan, at http://www.tceq.state.tx.us/compliance/field_ops/eapp/ast.html.

³⁷ See TCEQ Document No. 0724, *Underground Storage Tank Registration and Self-Certification Form*.

Wildlife and TCEQ. To determine whether your project may affect an endangered or threatened species, visit with the Texas Parks and Wildlife and review guidance material, such as the booklet listing Texas endangered and threatened species.³⁸

County and City Ordinances for Land Development

Beyond state and federal environmental permitting requirements, counties and cities often implement localized controls on land development, zoning, water quality discharges, and water consumption. It is imperative to check with the local authorities for applicable regulations and authorizations.

³⁸ See Endangered and Threatened Animals of Texas, available at <http://www.tpwd.state.tx.us/huntwild/wild/species/endang/index.phtml>.

V. Public Policy Implications

A. Command and Control Regulation

Public policy measures designed to address broader environmental concerns, such as air and water pollution, also shape the regulatory environment that the clean energy industry operates within. Traditionally, most of this regulation has been achieved through command and control measures, where government agencies control pollution through issuing permits for particular activities. “Harm-based standards” regulate the amount of a pollutant allowed according to scientific evidence on potential harm. Alternatively, “technology-based standards” mandate that regulated facilities use state of the art technology in their polluting activities.

B. Market-Based Regulation

Much of the current focus of current environmental and energy policy at a federal and local level has been on creation of clean energy markets to incentivize clean technology development. This incentivizing is achieved through tax breaks, subsidies, and market-based regulatory systems such as “cap-and-trade” regulations for carbon or sulfur dioxide emissions. Market-based regulatory systems, which allow companies to decide how much they can afford to pollute through tradable permits, achieve emission reductions at the lowest cost to society while providing motivation for the private sector to develop cleaner technologies. While these market-based systems address some cost concerns related to traditional command and control regulation, they introduce greater uncertainty regarding ultimate pollution levels and costs to business.

C. Human Health Issues

Much environmental regulation, particularly the air and water quality statutes developed in the 1970s, stems from a public concern about human health issues. This connection to human health results in a complex policy process that involves multiple interests and agencies. Government agencies such as Occupational Safety and Health Administration, which do not have mandates directly related to the environment, play important roles in regulating energy producing industries.

D. Energy Security

Policy makers have expressed an increased interest in clean energy as a way of reducing America’s dependence on foreign oil. Clean energy both addresses the public’s environmental concerns, and increases domestic energy production. Recent legislation, such as the 2005 Energy Policy Act and the 2007 Energy Independence and Security Act, focus on promoting clean technology through increased funding and other financial incentives.

VII. Commercialization Implications

A. New Markets

New forms of material, fuels, and electricity generation often depend on government support during development and will continue to do so during their early stages of commercialization. But the need for subsidies could disappear if lawmakers impose some sort of carbon tax or capped emissions and created tradable emissions permits; adding either could make clean technologies cost-competitive with conventional fuels such as oil and coal and influence the discussion between environmental and business issues (see Figure 1).



Figure 1: The growth of cleantech could occur by addressing both environmental and business issues.

Much of the current excitement in the cleantech sector stems from new advances in technologies like photovoltaic panels and wind turbines. But lesser known endeavors, such as increasing the efficiency of lighting and appliances, probably offer greater investment returns in the short term.

B. Regulation's Influence on Innovation

There is a growing interest in environmental regulation, especially with many companies expecting to be regulated in some manner when it comes to greenhouse gas emissions. It is expected that many new regulations are on the horizon with the new presidential administration. The role of government in shaping markets can certainly be debated; yet, many historical research studies confirm that regulatory mandates influence innovations. Government structure can align well with the private sector, thereby inciting innovative activity; such a trend has surfaced with patent filing following major legislation from the EPA (see Figure 2).

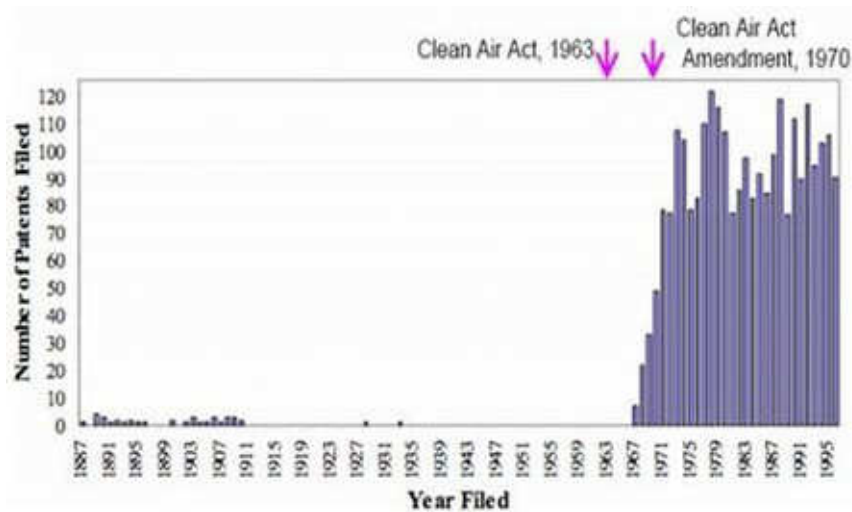


Image courtesy of Heslin Rothenberg Farley & Mesiti P.C.

Figure 2: A rise in U.S. patents filed have occurred after passage of the Clean Air Act.

The granting of patents by the US Patent and Trademark Office is often cited as a measure of inventive activity. The Clean Energy Patent Growth Index was developed by Heslin Rothenberg Farley & Mesiti P.C., an intellectual property law firm in Albany, New York; the index indicates the trend of innovative activity in the cleantech sector starting from 2002 through an investigation of granted patents and trademark applications (see Figures 3, 4, and 5)³⁹.

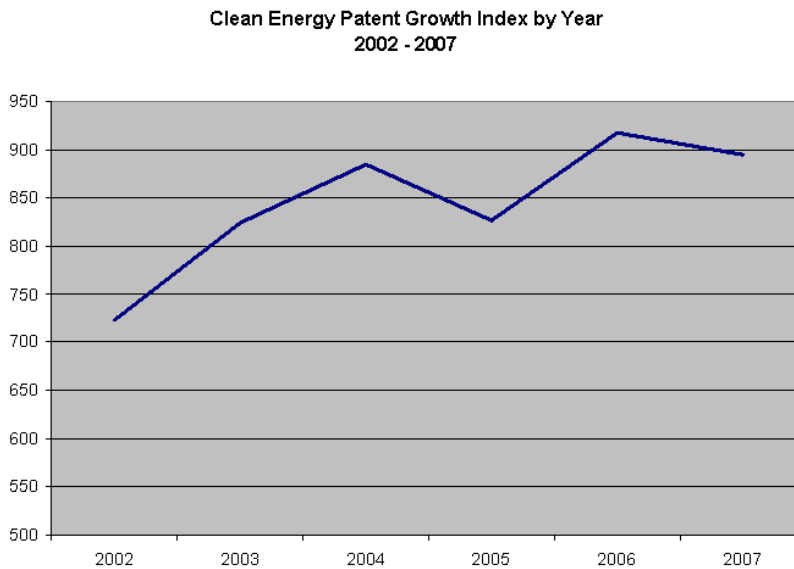


Image courtesy of Heslin Rothenberg Farley & Mesiti P.C.

Figure 3: A rise in clean energy patents granted began early during the current decade.

³⁹ See <<http://www.cleanenergypatentgrowthindex.com/>>.

All Sectors Patents by Quarter 2002 - 2007

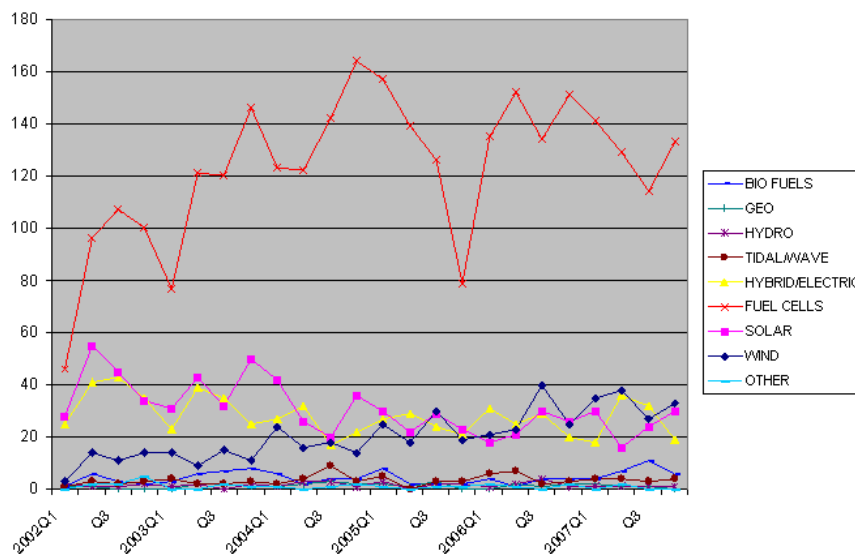


Image courtesy of Heslin Rothenberg Farley & Mesiti P.C.

Figure 4: A breakdown of granted clean energy patents by technology sector.

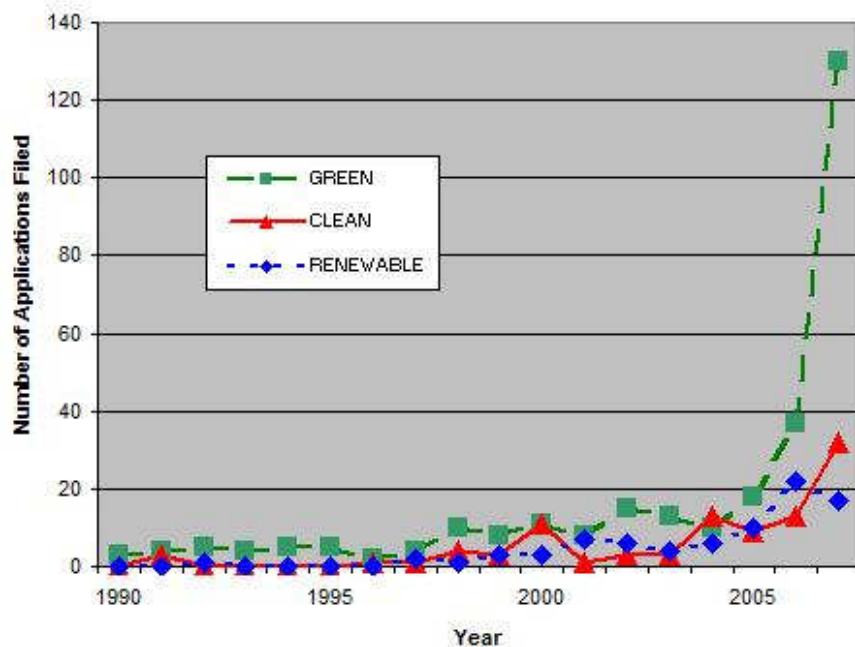


Image courtesy of Heslin Rothenberg Farley & Mesiti P.C.

Figure 5: Trademark applications that incorporate green have noticeably spiked in recent years.

VIII. Case Study: Computer Recycling Program

The state of Texas offers incentives that may be applicable towards regulation of the environment, such as the Computer Recycling Program. The Texas House and Senate have both passed an identical version of a bill that would require computer companies doing business in the state to provide free recycling services for those machines. The bill was backed by both Dell and Hewlett Packard and the TCEQ has opened a new statewide program website for recycling computer equipment.

The program, created by House Bill 2714 passed in 2007, requires computer manufactures that sell in Texas, to offer consumers convenient, free recycling on their brands of computer equipment. Only new computer equipment retailers are permitted to sell in Texas is equipment that was made by a manufacturer appearing on the TCEQ's list of manufacturers that have joined the program. The law is intended to ease the costs to local governments for providing recycling.

Computer equipment that can be recycled through this program includes desktop and laptop computers, monitors and the accompanying keyboard and mouse made by the same manufacturer (see Figure 6). Program details and information on how Texans can recycle used computer equipment, as well as the list of manufacturers and their recycling programs is online at: www.TexasRecyclesComputers.org .



Image Courtesy of Toshiba

Figure 6: The steps involved in the recycling of computer equipment.

IX. Conclusion

Cleantech innovations in nanomaterials, biodegradable materials, battery materials, recycling technologies, packaging, water purification, and air filtration systems will necessitate development of regulations to spur the growth of the cleantech industry. Additional examples that require the application of environmental regulation include establishing regional emissions targets, new environmental standards for constructions of green buildings, and requirements for reformulation of fuels.

Depending on the type of operation and emissions into various environmental media, several regulatory permits may be required to remain in compliance with state and federal environmental rules. The TCEQ offers a great starting point for information and will provide free assistance to any small business seeking help. To avoid any potential liability or compliance issues down the road, however, any startup business should consider hiring an experienced environmental consultant and attorney for application assistance to assure that the permit meets environmental standards.

However, the field of clean energy technologies is in its infancy and encompassing environmental regulations are considered vaguely defined and largely untested. Future environmental regulations will need to address interconnection standards for distributed generation, Renewable Portfolio Standards, and frameworks for geological sequestration of carbon dioxide. Further developments of environmental regulations will include establishing regional emissions targets, new environmental standards for constructions of green buildings, and requirements for reformulation of fuels. The impact of regulations on the cleantech industry will impact human health issues, energy security, commercialization activities, and the environment.

X. Terminology

Command and Control Regulation – Traditional environmental regulation involving the issuing of permits to individuals and companies involved in polluting activities

Market Based Regulation – More recent environmental regulation that uses markets for tradable permits to lower overall costs to society and incentivize technology development

Conventional Pollutant – A non-toxic air pollutant for which there is an ambient concentration that is environmentally acceptable

Attainment Area – An area that has achieved the National Ambient Air Quality Standard determined for by the EPA. Regulations for facilities in attainment areas can be more relaxed than for those in non-attainment areas.

Navigable Waters – Surface waters regulated by the Clean Water Act

Greenhouse Gases – Six gases that have been scientifically determined to contribute to global warming. Commonly referred to as CO₂ equivalents.

Point Sources – Polluters that discharge chemicals into a body of water from a single, concentrated source, as opposed to run off from an agricultural field or construction site

Stationary Sources – Facilities that emit pollutants into the air, as opposed to mobile sources such as cars or trucks.