

Solid Waste Conversion and Renewable Energy: A Legislative Review of AB 2770, SB 1038, and SB 1078

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Introduction

Three legislative actions intertwined solid waste conversion and energy generation in the fall of 2002. The primary public and private attention focused on passage of California's new Renewable Portfolio Standard, or RPS, pursuant to Senate Bill 1078. Implementation of the RPS fell to the California Energy Commission (CEC), as defined in Senate Bill 1038. Both were brought by Senator Byron Sher to the Legislature for consideration and to Governor Gray Davis for passage the same day (September 12, 2002) as the RPS. Following by eight days, Senator Matthews carried Assembly Bill 2770 to the legislature, a bill addressing the conversion of solid waste into fuels for energy generation.

With attention on the RPS, passage of the Conversion Technology bill occurred almost without agency or public notice. Months were to go by before CEC staff became fully aware of provisions for solid waste to be converted to renewable energy, and of the implications for shared purview with the California Integrated Waste Management Board ("Board", or CIWMB)¹. Yet major sections of the language of SB 1038 and AB 2770 were essentially replicated, defining the specific conditions by which solid waste could be converted to clean burning fuels for generation of "renewable energy". An important precedent for waste conversion to renewable energy generation has been set into law. Inconsistencies, technical inaccuracies and confusion inherent in that parallel bill language were also encoded. "Clean-up" legislation has already begun, with encoding of SB 183 harmonizing the relationship between impacted sections of the Public Resources Code and Public Utilities Code². Further assessment is almost certain to again revise the statutes.

SB 1038 also required that the CEC produce "Renewable Energy Guidebooks" to outline the regulatory path by which facilities complying with the harmonized language could then be deemed "eligible renewable energy generators". Similarly, AB 2770 directed CIWMB to promulgate regulations surrounding implementation of conversion technology. Revision of Board permitting and enforcement structure proceeds toward consideration of a final draft by the Board and the public, prior to submission to the Legislature for final approval³. CEC has now proposed revision of the Renewables Portfolio Standard Eligibility Guidebook to specifically address eligibility criteria for Municipal Solid Waste Conversion Facilities, in this interim period prior to full CIWMB regulatory implementation⁴.

Both regulatory actions will seek final approval and implementation later this year. This legislative review is offered to facilitate the highly detailed consideration needed for integration of this multi-agency path for regulatory implementation.

¹ CIWMB comments to CEC Docket 03-RPS-1078, March 23, 2003.

² SB 183, Sher. Energy: renewable technologies. October 2, 2003.

³ CIWMB Board Meeting, November 19-20, 2003. Agenda Item 8: "Discussion and Request for Rulemaking Direction to Formally Notice Proposed Amendments to the Transfer/Processing Operations and Facilities Regulatory Requirements Regulations to Address Conversion Technology Operations and Facilities".

⁴ CEC, Notice to Consider Adoption of Changes to the *Renewables Portfolio Standard Eligibility Guidebook*. Docket No. 03-RPS-1078 and Docket No. 02-REN-1038. July 30, 2004.

Legislative Analysis

Beginning with Senator Matthews' Conversion Technology bill, a careful interpretation of each line helps highlight potential implementation difficulties, technical inaccuracies, and confusion of definition. Following AB 2770 assessment, consideration is given to specific sections of both SB 1078 and to SB 1038 that have particularly direct impact upon Conversion Technologies.

Seven "performance criteria" were established by AB 2770; this was expanded to *eight*, in the complementary language of SB 1038, as discussed below. Each encoded *criterion* is relatively and perhaps deceptively brief. Strict adherence to *all* of the stipulations is required for permitting, and separately, for certification as an eligible renewable energy generation facility.

One measure of efficacy in legislation is the degree of fairness achieved among competing interests: if one sector receives a particular mandate, is there a similar standard for similar and competing interests? Attempts to "level the playing field" must therefore identify and attend to instances where an unfair advantage, or disadvantage, is created by the applicable laws. Comments annotating each mandate are therefore intended to pose one basic question: is this element an achievable, desirable, and equitable requirement? If *one* of the stipulations fails this test, *all* must be considered subject to revision.

Bill language is *in italics* and is excerpted to focus on specific issues.

AB 2770, Matthews. Solid waste: conversion technologies. (Signed September 20, 2003)

Section 1. Section 40117 is added to the Public Resources Code, to read:

40117. "Gasification" means a technology that uses a noncombustion thermal process to convert solid waste to a clean burning fuel for the purpose of generating electricity, and that, at a minimum, meets all of the following criteria:

(a) The technology does not use air or oxygen in the conversion process, except ambient air to maintain temperature control.

Comment: In implementing a "non-combustion thermal process" for feedstock conversion to a clean burning fuel, in strict compliance with this criteria, the stoichiometric balance of oxygen to carbon must be maintained as a *reductive*, not an *oxidative* atmosphere. The relationship between *air* and *temperature control* is obtuse: temperature control can be affected by aeration management, but the concept of controlling temperature by varying air flow does not address the more critical issue of combustion bi-products control.

To cleave available carbon molecular chains into smaller segments is to cause an energy-releasing (exothermic) reaction that, in the parlance of the science of combustion chemistry, is considered "combustion", whether or not a flame occurs. Retention of feedstock in this thermal processing condition progressively creates smaller and smaller carbon "clusters", until the desired end-product is a gas, rather than a solid. That desired "clean-burning synthetic gas" or syngas is predominantly composed of single carbon atoms attached to one or more oxygen molecules (carbon monoxide, CO, or carbon dioxide, CO₂). As carbon molecules are broken away from their more complex chains, *something* must be present to fill the valence void; oxygen is the appropriate complement, when combustible syngas is the desired product.

True, shifting process controls toward an *oxidative* atmosphere with greater oxygen supply would increase rates of conversion (assuming constant feedstock conditions), resulting in an increase in chamber temperatures. Decreasing either or both the available carbon or available oxygen will in general lower the conversion chamber temperature. Yet increasing carbon availability far in excess of oxygen availability would be counter-productive to syngas generation, creating *char*, or other heavier molecular weight products in a process considered *pyrolysis* rather than *gasification*. Variability of feedstock, inherent in the composition of refuse derived fuels, requires constant minute changes in levels of oxygenation. Change in temperature therefore could ostensibly be monitored to indicate stoichiometric flux, but not to precisely manage conversion.

The impetus for addition of this line of “performance criteria” was apparently not predicated upon a sound scientific or legal foundation. Creation of a “clean-burning syngas” does not require exclusion of either air or oxygen. As an example, “oxygen flood gasification” common to certain forms of petroleum and coal processing are technical realities quite capable of matching regulatory stipulations for environmental quality. The composition of the syngas will reflect the stoichiometric balance maintained and the feedstock supplied. If the feedstock stream normally contains contaminants whose products of oxidation are particularly onerous, greater cleaning will be necessary. Control of the syngas product quality thus must be addressed *throughout* the process, from feedstock selection through conversion, to final cleaning. Establishment of product quality standards would equate to creation of appropriate *performance* standards; stipulation of arbitrary process control does not achieve the stated goal of ensuring a “clean-burning fuel”.

(b) *The technology produces no discharges of air contaminants or emissions*

Comment: The non-combustion thermal conversion technology core unit, or retort, operated within a Facility will also be fully controlled, such that no fugitive release of gas occurs. No segregation or other manipulation of the “syngas” product stream that releases any constituent to the atmosphere would be acceptable operation. The entire gaseous flow from waste conversion is engineered to be a “product”, whether that flow is separated into sub-products or fed directly into electricity generation equipment.

(c) *The technology produces no discharges to surface or groundwaters of the state.*

Comment: No quench fluids or other liquids may be surface-released or allowed to impact groundwater; Facility engineering must control all constituents of the conversion process. Permitting requirements for on-site feedstock receipt, storage and processing similarly (and separately) must protect leachate release to surface or groundwaters.

(d) *The technology produces no hazardous waste.*

Comment: Only *product* should emerge from the conversion process; combustible syngas, and inert molten glass-like material suitable for production of structural building materials, road-base and/or tile. Yet “waste generation” *must be anticipated and planned for within permitting, and shall not be determined hazardous* under current appropriate codes and regulations. Perhaps the law should also have recognized the need to *anticipate and plan for* generation of hazardous waste. What would be the consequence, under current language, of inadvertently spilling a dram of VOC?

(e) *To the maximum extent feasible, the technology removes all recyclable materials and marketable green waste Compostable materials from the solid waste stream prior to conversion process and the owner or operator of the facility certifies that those materials will be recycled or composted.*

Comment: Solid Waste Conversion facilities have the potential to provide an excellent means of regional pollution control, waste management and resource recovery. Processing and volume reduction prior to or following feedstock receipt, affords opportunity for removal of a large fraction of recyclable materials from the feedstock.

Worthy of further investigation are “co-location” opportunities to maximize recycling, by segregation for “high-grade” waste materials suitable as recycled product for resale to appropriate remanufacturing venues. As an alternative offering better economics, there is the potential to attract industrial firms for co-location of waste reprocessing and recovery facilities on-site. Waste tire derived feedstock conversion could be c-located with facilities for retread, crumb rubber production, remolding, as examples. Co-engineering such operations for optimal utilization of Facility-generated electric and thermal energy (combined heat and power, or “CHP”) appears to offer synergies that greatly reduce cost while increasing overall “industrial park” energy efficiency and production flexibility.

(f) *The facility where the technology is used is in compliance with all applicable laws, regulations and ordinances.*

Comment: The Facility thus must prove to CIWMB, and through a Finding recognizing that proof, certify to the CEC, that ALL permits are in place. This would include any other local, state and/or federal permitting requirement. A “Catch 22” is imposed: a project proponent must know the facility is eligible for supplemental energy payments under the RPS to receive financing, but somehow must show proof of full regulatory compliance BEFORE a determination of eligibility will be issued.

(g) *The facility certifies to the Board [CIWMB] that any local agency sending solid waste to the facility is in compliance with this division and has reduced, recycled, or composted solid waste to the maximum extent feasible, and that the board makes a finding that the local agency has diverted at least 30 percent of all solid waste through source reduction, recycling and composting.*

Comment: The Facility is required to receive and maintain on-going proof of prior appropriate recycling and resource recovery by feedstock sources. This is similar to manifesting requirements for a Class I or II waste facility, and to the current waste tire processing manifest regime. Some as-yet undetermined CIWMB approval will therefore be required for *each source-specific stream of feedstock* to be approved for acceptance at the Facility.

The CIWMB will remain lead agency for determinations of status of municipal compliance with the provisions of resource recovery, recycling and source segregation regulations necessary to access any Gasification Facility.

SB 1038, Sher: The CEC’s “Renewable Energy Program”

The California Public Utilities Commission (CPUC) holds primary purview for the “Renewable Portfolio Standard”, pursuant to SB 1078 Sher, signed September 12, 2002. Implementation of the RPS continues; the CEC is formally enjoined as collaborator in this implementation, under

provision of the “Renewable Energy Program” or REP, pursuant to SB 1038, Sher, signed the same day. Note that AB 2770 was encoded eight days later, on September 20, 2002. This lag seems to explain much of the agency confusion relating provisions of the companion Senate and Assembly bills.

The REP delves into many “energy” issues that extend well beyond the RPS, but the primary focus is on defining a mechanism for CEC financial support of RPS energy contracts. Eligibility for participation in the RPS, and for receipt of a Supplemental Energy Payments, or SEP, above the current energy market price, is exhaustively detailed. Implementation via regulatory development is occurring concurrent with CPUC’s RPS efforts, and concurrent with CIWMB’s own regulatory package for Conversion Technologies oversight implementation.

The degree of interagency collaboration and communication is significant, yet the CIWMB path is far less a collaborative effort directed toward “RPS Implementation”, than one dedicated to solid waste management. A “Double Jeopardy” is now becoming apparent:

- (1) Where conversion technologies are designed to compete within the RPS marketplace for generate and sale of renewable energy, this separate yet parallel regulatory development jeopardizes eligibility, and yet,
- (2) Where conversion technologies DO NOT intend to pursue sale of renewable electricity, the expected complexity of permitting regulations appears at least in part, unwarranted.

The following review selects encoded sections of SB 1038 that are most pertinent to conversion technologies. Few comments are added; the most significant element, that defining criteria for “solid waste conversion”, is almost (but, very importantly, *not quite*) identical to language of AB 2770, already discussed above.

SB 1038, Sher. Renewable Energy Program. (Signed into law September 12, 2002).
Section 5. Section 25620.5 of the Public Resources Code is amended to read:

25620.5. [addresses mechanisms to solicit applications for awards, grants, loans, contracts or other vehicles used to dispense Renewable Energy Program funds]

(d) The commission may establish interagency agreements.

Comment: This provision for REP implementation should be considered approval to enter into an interagency agreement with CIWMB regarding proper purview for enforcement and monitoring of all waste management aspects of the proposed repowering project. Interagency agreements provide the mechanism for on-going Certification to the Energy Commission of non-energy regulatory compliance as stipulated in later sections.

Section 6. Section 25620.7 of the Public Resources Code is amended to read:

25620.7. (a) The commission may contract for, or through interagency agreement obtain, technical, scientific or administrative services or expertise from one or more entities, to support the program. Funding for this purpose shall be made from money in the Public Interest Research, Development and Demonstration Fund.

Comment: This supports author’s Comments to Record during CEC and CPUC implementation proceedings that the Energy Commission immediately solicit expertise necessary to first “define” the types of Renewable Energy technologies, and second, to develop a process through which to “Certify” eligible resources by establishing technology-specific

criteria. The section is pertinent in particular to quickly enjoining CIWMB lead staff, and further for interagency funding support of concurrent CIWMB-lead research, development and documentation to the legislature on the status of non-combustion thermal processes for waste conversion.

Sec. 13. Section 353.2 is added to the Public Utilities Code, to read:

353.2. (a) As used in this article, “ultra-clean and low emission distributed generation” means any electric generation technology that meets all of the following criteria:

- (1) Commences initial operation between January 1, 2003, and December 31, 2005.*
- (2) Produces zero emissions during its operation or produces emissions during its operation that are equal to or less than the 2007 State Air Resources Board emission limits for distributed generation, except that technologies operated by combustion must operate in a combined heat and power application with a 60-percent system efficiency on higher heating value.*

(b) In establishing rates and fees, the commission may consider energy efficiency and emissions performance to encourage early compliance with air quality standards established by the State Air Resources Board for ultra-clean and low-emission distributed generation.

Comment: What is pertinent is that combustion of the syngas produced arguably *requires* that there be combined heat and power utilization to be considered in the category of “ultra-clean and low emissions distributed generation”. What remains in question is whether there is a size cut-off for distributed energy development that would make some facilities too large to qualify under this CHP allowance.

[Section 381 addresses “cost effective and energy efficient project funding”]

Section 15. Section 383.5 of the Public Utilities Code is amended to read:

(a) It is in the interest of the Legislature in establishing this program, to increase the amount of renewable electricity generation per year, so that it equals at least 17 percent of the total electricity generated for consumption in California.

(b) As used in this section, the following terms have the following meanings:

(1) “In-state renewable electricity generation technology” means a facility that meets all of the following criteria:

(A) The facility uses biomass solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and any additions or enhancements to the facility using that technology.

(B) The facility is located in the state or near the border of the state with the first point of connection to the Western Electric Coordinating Council (WECC) transmission system located within the state.

(C) For the purposes of this subdivision, “solid waste conversion”
[emphasis added] means a technology that uses a noncombustion thermal process to convert solid waste to a clean burning fuel for the purpose of generating electricity, and that meets all of the following criteria:

Comment: This section is nearly identical in wording to the criteria established by AB 2770 for a “gasification facility”. See author’s comments, “Legislative Review: AB 2770”, above. The difference is crucial, however: (b)(1)(C)(vii) adds CEC purview over and above CIWMB authority.

- i. *The technology does not use air or oxygen in the conversion process, except ambient air to maintain temperature control.*
- ii. *The technology produces no discharges of air contaminants or emissions, including greenhouse gases as defined in Section 42801 of the Health and Safety Code.*
- iii. *The technology produces no discharges to surface or groundwaters of the state.*
- iv. *The technology produces no hazardous wastes*
- v. *To the maximum extent feasible, the technology removes all recyclable materials and marketable green waste compostable materials from the solid waste stream prior to the conversion process and the owner or operator of the facility certifies that those materials will be recycled or composted.*
- vi. *The facility at which the technology is used is in compliance with all applicable laws, regulations, and ordinances.*
- vii. ***The technology meets any other conditions established by the State Energy Resources Conservation and Development Commission***
[emphasis added].

Comment: The CEC adds another layer of purview.

- viii. *The facility certifies that any local agency sending solid waste to the facility is in compliance with Division 30 (commencing with Section 40000) of the Public Resources Code, has reduced, recycled, or composted solid waste to the maximum extent feasible, and shall have been found by the California Integrated Waste Management Board to have diverted at least 30 percent of all solid waste through source reduction, recycling and composting.*

Comment: Note that this time, the “facility must certify” to the CEC, now in addition to the certification to CIWMB concurrently required by AB 2770 language. In the CEC’s Final Committee Report “RPS: Decision on Phase 1 Implementation Issues” (May 2003; # 500-03-023FD), the conversion facility owner “Certifies” to the CEC that a CIWMB “Finding” has been issued for compliance. Yet note that this is “source specific”: As this stands, a separate CIWMB “Finding” must be issued to the Facility owner, and delivered to and accepted by the CEC, for EACH “local agency sending solid waste”.

Other Relevant Sections:

383.5 (c) and (d) [addresses support payment criteria, restrictions]

(d)(3) Repowered existing facilities shall be eligible for funding under this subdivision if the capital investment to repower the existing facility equals at least 80 percent of the value of the repowered facility.

(d)(4) Facilities engaging in the combustion of municipal solid waste or tires are not eligible for funding under this subdivision.

(e) [emerging DG support]

(f) [Direct Access customer support; Customer Credits]

(g) [Customer Education Account funding]

(h) [Establishment of "Guidelines" and of funding for development and adoption of such guidelines]

(i) [Report to Legislature]

(j) ["Comprehensive renewable electricity generation resource plan"]

(k) [CEC participation in CPUC renewable energy Proceedings]

383.6 [Report to Legislature of Transmission Plan that reflects cost effective expansion necessary to facilitate development of renewable electricity generation facilities identified in "resource plan".]

394.25 [Enforcement: revoke or suspend registration. Provisions, restrictions, criteria]

399.7 (a) [PIER]

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