In the one-dimensional growth problem, a crucial quantity is represented by $W^*(\sigma) - \varrho M_B$, where $W^*(\sigma)$ is the Legendre transform of the free energy $W(\lambda)$ per unit referential length and ϱM_B is the chemical energy needed to create a length of solid material.

The equation governing accretion tells us that when a reference unit length of solid material is created, the amount of energy provided from the exterior is equal to $W^*(\sigma) - M_B\varrho$.

The dissipation rate turns out to be

$$\delta = (W^*(\sigma) - M\varrho + \mu\varrho)V, \tag{1}$$

where V is the accretion velocity, μ is the chemical potential of the free monomers, M is the chemical energy of the bound monomers, and $W^*(\sigma)$ is the Legendre transform of the strain energy $W(\sigma)$.

In thermodynamics, the equivalent of the strain energy $W(\sigma)$ is the free energy

$$F(T, V, N) = U(S, V, N) - TS. \tag{2}$$

In thermodynamics the Legendre transform of the free energy with respect to V is the Gibbs free energy, defined as

$$G(T, p, N) = F(T, V, N) - pV. \tag{3}$$

Thus, if the quantities σ and λ correspond, respectively, to pressure and volume, we may argue that the thermodynamical equivalent of the Legendre transform $W^*(\sigma)$ is the Gibbs free energy. Thus, it would seem that the driving force for accretion of a thermodynamic system with a variable number of elements is

$$G - \mu\Omega, \tag{4}$$

where Ω is the specific volume of a particle in the reference state.