This thesis explores the deep relation between gravitational dynamics and thermodynamics. It focuses on the notion that the gravitational dynamics is encoded in the thermodynamic equilibrium conditions applied to locally constructed, observer-dependent causal horizons. At the level of the (semi)classical gravity, we show that this approach leads to Weyl transverse gravity. The classical solutions of this gravitational theory are the same as those of general relativity, but it has different local symmetries, which leads to a different origin of the cosmological constant. As a useful computational tool for the (semi)classical part of the thesis, we also develop covariant phase space formalism for Weyl transverse gravity and identify the corresponding Wald entropy. We also generalise the formalism to arbitrary gravitational theories with the same symmetry group. Moreover, we explore the implications of the equivalence between gravitational dynamics and local equilibrium conditions for the low energy quantum gravitational dynamics. At the linearised level, we find a result consistent with quadratic gravity. However, beyond the linearised regime the dynamics becomes significantly different from quadratic gravity. We derive the equations for gravitational dynamics that capture this difference and study their physical implications on the example of the homogeneous, isotropic cosmologies. The thesis is conceived as a self-contained introductory text into the relationship between thermodynamics and Weyl transverse gravity, as well as into our program to search for the implications of thermodynamics for quantum gravitational dynamics.