LL’s in graphene can be obtained via semiclassical quantization if we buy that EM field can be coupled to the "Dirac" hamiltonian through usual Peierls substitution,
\[ \vec{P} = \vec{p} + \frac{e}{c} \vec{A}, \] (1)
where \( \vec{P} \) and \( \vec{p} \) are canonical and kinematic momenta, and \( \vec{A} \) is the vector potential.

Suppose the magnetic field \( H \) is perpendicular to the graphene layer. Then the in plane motion is quantized, and for LL with large quantum number the motion is quasiclassical. Therefore, the corresponding levels can be obtained via quantization of adiabatic invariant of classical motion (which is the action for a particle in a magnetic field)
\[ \frac{1}{2\pi} \oint \vec{P} d\vec{r} = n\hbar, \vec{P} = (p_x - \frac{eH}{c} y, p_y). \] (2)
If we choose Landau gauge, \( \vec{A} = (-Hy, 0, 0) \), the coordinate \( x \) is cyclic (the Hamiltonian does not depend on it), and the conjugated momentum is conserved:
\[ P_x = \text{const} \Rightarrow dp_x = \frac{eH}{c} dy \] (3)
Using this relation, the quantization rule becomes
\[ \frac{c}{2\pi eH} \oint p_y dp_x = n\hbar. \] (4)
Now the integral \( \oint p_y dp_x \) is just the area of the isoenergetic surface (circle in our case), i.e.
\[ \oint p_y dp_x = \pi p^2. \]
Taking into account the linear dispersion \( \varepsilon = v_F p \), we obtain for large \( n \)
\[ \frac{c\varepsilon^2}{2v_F^2 eH} = n\hbar \Rightarrow \varepsilon_n = \sqrt{\frac{2e hv_F^2 H}{c}} n, \] (5)
which coincides with the exact result. Note that usually \( n \) appears as \( n + \gamma \), \( \gamma < 1 \). But in this particular case \( \gamma = 0 \), i.e. LL’s start from exactly zero energy. This cannot be seen from such a simplified treatment as the present one.