We also see that when: $\Delta\varphi_{BA} = \pm 1\pi, \pm 3\pi, \pm 5\pi, \ldots = \pm n_{odd}\pi$

since: $\cos(\theta \pm n_{odd}\pi) = (\cos\theta \cdot \cos n_{odd}\pi) \mp (\sin\theta \cdot \cancel{\sin n_{odd}\pi}) = -\cos\theta$, the ***total*** energy density is ***all*** in the form of ***kinetic*** energy density:

$$w_{potl}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t + \cos(\omega t \pm n_{odd}\pi)\right]^2 = 0$$

$$w_{kin}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t - \cos(\omega t + \Delta\varphi_{BA}^o)\right]^2 = \frac{1}{2}\frac{4|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t = \frac{2|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t$$

$$w_{tot}^{inst}(x=0,t) \equiv w_{potl}^{inst}(x=0,t) + w_{kin}^{inst}(x=0,t) = \frac{2|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t = \frac{2|\tilde{A}|^2}{z_o c}\cos^2\omega t$$

The ***time-averaged*** potential, kinetic and total energy densities associated with two counter-propagating 1-D monochromatic traveling plane waves are:

$$\left\langle w_{potl}(x,t)\right\rangle_t = \frac{1}{2}\frac{\left\langle p_{tot}^2(x,t)\right\rangle_t}{\rho_o c^2} = \frac{1}{4}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[1 + |\tilde{R}|^2 + 2|\tilde{R}|\cos(2kx + \Delta\varphi_{BA}^o)\right]$$

$$\left\langle w_{kin}(x,t)\right\rangle_t = \frac{1}{2}\rho_o\left\langle u_{tot}^{\parallel 2}(x,t)\right\rangle_t = \frac{1}{4}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[1 + |\tilde{R}|^2 - 2|\tilde{R}|\cos(2kx + \Delta\varphi_{BA}^o)\right]$$

$$\left\langle w_{tot}(x,t)\right\rangle_t \equiv \left\langle w_{potl}(x,t)\right\rangle_t + \left\langle w_{kin}(x,t)\right\rangle_t = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[1 + |\tilde{R}|^2\right] = \frac{1}{2}\frac{|\tilde{A}|^2}{z_o c}\left[1 + |\tilde{R}|^2\right]$$

Note ***here***, that the ratio of the ***time-averaged potential*** energy density to the ***time-averaged kinetic*** energy density is ***not*** equal to unity for counter-propagating monochromatic plane waves:

$$\frac{\left\langle w_{potl}(x,t)\right\rangle_t}{\left\langle w_{kin}(x,t)\right\rangle_t} = \frac{\frac{1}{2}\frac{\left\langle p_{tot}^2(x,t)\right\rangle_t}{\rho_o c^2}}{\frac{1}{2}\rho_o\left\langle u_{tot}^{\parallel 2}(x,t)\right\rangle_t} = \frac{\left[1 + |\tilde{R}|^2 + 2|\tilde{R}|\cos(2kx + \Delta\varphi_{BA}^o)\right]}{\left[1 + |\tilde{R}|^2 - 2|\tilde{R}|\cos(2kx + \Delta\varphi_{BA}^o)\right]} \neq 1$$

Again, for an observer's position at $x = 0$ **.and.** $|\tilde{R}| \equiv |\tilde{B}|/|\tilde{A}| = 1$ (*i.e.* a "***pure***" standing wave), these quantities reduce to:

$$\left\langle w_{potl}(x=0,t)\right\rangle_t = \frac{1}{2}\frac{\left\langle p_{tot}^2(x=0,t)\right\rangle_t}{\rho_o c^2} = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[1 + \cos\Delta\varphi_{BA}^o\right]$$

$$\left\langle w_{kin}(x=0,t)\right\rangle_t = \frac{1}{2}\rho_o\left\langle u_{tot}^{\parallel 2}(x=0,t)\right\rangle_t = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[1 - \cos\Delta\varphi_{BA}^o\right]$$