How works a resonant converter? Part 2

$U_C = U_B - U_B * \cos(\omega t)$
$I_L = I_{peak} * \sin(\omega t)$
$I_{RMS} = I_{peak} / \sqrt{2}$ (when sinusoidal)
$I_{peak} = C\, \omega\, 2\, U_C = C\, \omega\, 4\, U_B$

W_C

$$= \int^{T/2} I_L \cdot U_C \, dt = C \int^{T/2} \omega 4 U_B \sin\omega t \, U_B (1 - \cos(\omega t)) dt$$

$$= C 4 U_B^2 \, \omega \int^{T/2} (\sin(\omega t) - \tfrac{1}{2} \sin(2\omega t)) dt$$

➔ $W_C = C4U^2_B \; ½ = 2\, C\, U^2_B = 2QU_B = ½\; W_B$

There is only half of the energy supplied by the battery on the C!
The other half has dissipated as heat!

What to do to reduce this loss?

Since
$\omega^2 = 1/LC$
$\omega = 2\pi f = 2\pi/T$
$Z = \sqrt{L/C}$ = Impedance
$I = U/Z$

The system loss on charging the C can be reduced by selecting C very small and L very large at same frequency ω, so that the charging current I for the capacitor and thus the energy stored on the C gets minimal.

re March 4 2009