In recent DIII-D experiments, we have systematically studied the physics that affects the choices of parameters for a discharge where the goal is 100% noninductively driven current ($f_{NI} = 1$) at high plasma pressure ($\beta_N \approx 4$). The self-consistent response of the temperature ($T$), density ($n$), and bootstrap current density ($J_{BS}$) profiles was measured in a scan of the $q$ profile, varying $q_{min}$ and $q_{95}$ independently at $N = 3.5$. The focus was on weak shear discharges without large, local pressure gradients that would reduce the stable $N$. Both the bootstrap current fraction ($f_{BS}$) and $f_{NI}$ increased with $q_{95}$, with $q_{95} > 6$ required for $f_{BS} > 0.5$. With sufficiently high $\beta_N$, the $J_{BS}$ profiles are relatively uniform in the region between the axis and the H-mode pedestal so that the current density $J >> J_{BS}$ over the inner half of the discharge. This leads to a requirement for external current drive that is centrally peaked. Adjustment of the toroidal field strength ($B_T$) was found to be a tool to obtain a balance between the required current drive and heating powers when all external power sources provide both heating and current drive. At fixed $\beta_N$ and $q_{95}$, the externally driven current fraction increases with $B_T$ allowing $f_{NI}$ to be adjusted to a target value which, ideally, is 1. Typically $H_{98} = 1.5$, but as $n$ decreases during the high $\beta_N$ phase of the discharge as the wall particle source is depleted, a trend toward decreasing $\tau_e$ is observed. This places constraints on the ability to reduce $n$ in order to maximize the total externally driven current. To obtain $f_{NI} = 1$, $f_{BS} > 0.5$ with $q_{95}$ reduced to 5 for increased fusion gain, the focus now is on $q_{min} > 2$ at increased $\beta_N$. High $q_{min}$ minimizes the external current drive requirements near the axis by reducing $J$ and, for a given pressure gradient, increasing $J_{BS}$ in that region. An increase in $\beta_N$ through pressure profile broadening is the route to higher $f_{BS}$. Off axis neutral beam injection is a key tool to broaden the fast ion pressure profile (and thus the total pressure), to avoid excess $J_{NBCD}$ near the axis, and to drive current off axis where it is needed at reduced $q_{95}$. Off axis ECCD drives current and provides electron heating to increase both $J_{BS}$ and $J_{NBCD}$. 

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