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(54) **SYSTEMS AND METHODS FOR
DOWNHOLE POWER GENERATION**

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(57) **ABSTRACT**

In some implementations, a plurality of thermoelectric devices may be arranged to cool one or more components of a downhole drilling component during drilling operations. A current can be applied to one or more thermoelectric devices to generate a cooling effect. The thermoelectric devices can be located and arranged so that they cool some or all of a bottom hole assembly or components thereof, such as one or more sensors, batteries, processors, electric, and the like. The thermoelectric devices also may be located and arranged to cool sensors, batteries, other downhole components, and/or drilling mud in a wellbore during drilling operations. A plurality of thermoelectric devices may be used to generate electric power downhole from a temperature difference. The electric power may be used to power sensors, processors, charge batteries, and be used by one or more downhole electric components, such as those in a bottom hold assembly. One or more thermal storage devices may be used with the thermoelectric devices to store thermal energy for use when needed. A control system may be used to control the activation and/or deactivation of one or more thermoelectric devices to provide cooling when desired.

